

DMS
ROCKY FLATS PLANT
ENVIRONMENTAL RESTORATION

HEALTH AND SAFETY
PROGRAM PLAN

OCTOBER 26, 1990

EG&G- Rocky Flats, Inc.

ADMIN RECORD

A-SW-000397

REVIEWED FOR CLASSIFICATION/UCM

By George H. Detlock

Date 11/2/90

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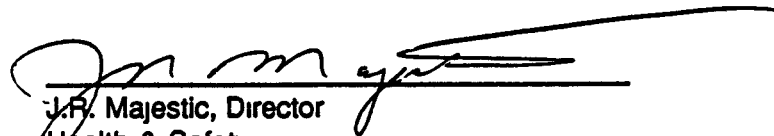
ENVIRONMENTAL RESTORATION HEALTH AND SAFETY PROGRAM PLAN AND WORKBOOK

REVIEW AND APPROVAL




J E Evered, Director
Environmental Restoration

11/2/90
Date



J.F. Majestic, Director
Health & Safety

11/2/90
Date



T C Greengard, Manager
Remediation Programs

11/2/90
Date



Dennis Smith, Health & Safety Officer
Environmental Restoration

Nov 2, 1990
Date

The following signatures document that the respective departments have reviewed the Environmental Restoration Health and Safety Program Plan and Workbook and agree that requirements which are managed at the RFP sites by their departments are believed to be technically correct.


Occupational Safety Representative


11-2-90
Date


Industrial Hygiene Representative

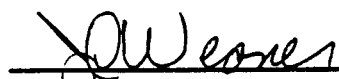
11-2-90
Date


Radiological Engineering Representative

11-2-90
Date


Radiological Operations

11/2/90
Date


Health & Safety Area Engineering

11-2-90
Date


Occupational Health Representative

11/2/90
Date


Fire Protection Representative

11/2/90
Date

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CHAPTER 1

INTRODUCTION

1.0 Overview

This document is the Health and Safety Program Plan (HSPP) for the Environmental Restoration (ER) Directorate's chemical and radiological remediation program at the Rocky Flats Plant (RFP). Its purpose is to provide a framework that identifies the policies, standards, and essential elements of health and safety that are to be addressed when planning and carrying out remediation activities. The RFP is owned by the U.S. Department of Energy (DOE) and operated by EG&G- Rocky Flats, Inc (EG&G)

1.1 Policy

EG&G at Rocky Flats, in conjunction with the DOE, has adopted the Federal Occupational Safety & Health Administration's (OSHA) standard for hazardous waste site workers (29 CFR 1910.120). Some sections of the OSHA standard are superseded by more stringent policies and procedures established by EG&G, the Department of Energy and/or other government agencies such as the Environmental Protection Agency (EPA) and the Colorado Department of Health (CDH). The intent of this written program is to integrate the performance requirements of the OSHA standard and other governmental agencies with existing Rocky Flats policies and standards, in a manner which best serves the health and safety of workers, visitors and the surrounding population.

It is EG&G's intention for this plan and accompanying workbook to establish the foundation from which all "site-specific" health and safety plans are to be written. EG&G fully understands the

need for project specific flexibility and allows for sound professional judgement in the implementation of this program. The Health and Safety Liaison officer (with technical support from various health and safety divisions, including industrial hygiene, Radiological Engineering and Operations, Occupational Safety, Occupational Health, Health & Safety Area Engineering, and Fire Protection) evaluates each health and safety plan for consistency with the requirements of regulatory agencies, plant policies, and sound safety and health practices prior to its implementation.

Subcontractors of EG&G are responsible for the preparation of their own site specific health and safety plans and must incorporate and enforce requirements which are at least as stringent as those presented in this document. (See the accompanying Site Health and Safety Plan Workbook, Appendix E, for the Contractor Health and Safety Plan Evaluation)

1.2 Application

This written health and safety program plan establishes the minimum health and safety requirements for all Rocky Flats DOE, EG&G and subcontract personnel who physically work on any of the Environmental Restoration hazardous waste sites¹. Individuals responsible for developing site specific plans are encouraged to use this document and the accompanying Workbook as a guide to fulfilling the minimum requirements and to locating available Rocky Flats resources. These resources include in-house health and safety professionals, written health and safety procedures, emergency contacts and existing site characterizations.

¹ Appendix A contains OSHA Regulation 29 CFR 1910.120 Page 1 of that document describes the regulatory scope and application in detail.

This ER Health and Safety Program Plan and the Workbook have been reviewed by appropriate Health and Safety Departments and approved by the Environmental Restoration Director, the Health and Safety Director, the Environmental Restoration Health and Safety Officer and the Health and Safety Liaison Officer.

1.3 Related DOE Orders and EG&G Practices

The following orders and procedures represent major references which supplement this document. All of these documents are available to Environmental Restoration Subcontractors at the ER library in building T-130B. The Health and Safety Liaison Officer also maintains a complete set of these references.

- o RFP Health and Safety Practices Manual
- o RCRA Permitting and Compliance Standard Operating Procedure
- o Rocky Flats Emergency Plan
- o DOE Order 5000.3, "Unusual Occurrence Reporting System"
- o DOE Order 5480.1B, "Environmental Safety and Health Program for Department of Energy Operations"
- o DOE Order 5480.4, "Environmental Protection, Safety, and Health Protection Standards"
- o DOE Order 5480.8, "Contractor Occupation Medical Program"
- o DOE Order 5480.9, "Construction Health and Safety Program"
- o DOE Order 5480.10, "Contractor Industrial Hygiene Program"
- o DOE Order 5480.11, "Radiation Protection for Occupational Workers"
- o DOE Order 5483.1A, "Occupation Health and Safety Program for DOE Contractor Employees at Government-Owned, Contractor-Operated Facilities"

- o Federal Facility Agreement and Consent Order, commonly referred to as the Interagency Agreement or IAG entered into between DOE, the U S Environmental Protection Agency (EPA), and the Colorado Department of Health (CDH) (Tables 5 and 6 of this Agreement are included in Appendix II)

1.4 Description of Facility

The Rocky Flats Plant occupies 6550 acres of federally owned land approximately 16 miles northwest of Denver, Colorado (Figure 1-1). The production areas are located within a security-fenced area of 384 acres (Figure 1-2).

The plant is a DOE facility that produces components for nuclear weapons from plutonium, uranium, beryllium and stainless steel. Production activities include metal fabrication and assembly; chemical recovery and purification of transuranic radionuclides; and related quality control functions. Research and engineering programs in chemistry, physics, materials technology, ecology, nuclear safety and mechanical engineering support these production activities.

Product storage and waste management practices associated with many years of production operations have led to environmental contamination which is being assessed under the direction of the Environmental Restoration Directorate.

1.5 Anticipated Activities and Work Tasks

The ER Remedial Action Program's (Program) purpose is to investigate and clean up contaminated sites at DOE facilities. The Program is being implemented in five phases

- o Phase 1 - Installation Assessment.
includes site inspections and preliminary assessments of potential environmental concerns,
- o Phase 2 - Remedial Investigation.
includes planning and implementing sampling programs to determine the extent of contamination at specific sites and evaluating potential contaminant migration pathways.
- o Phase 3 - Feasibility Studies.
are conducted to evaluate remedial alternatives for mitigating environmental concerns identified during the Remedial Investigation,
- o Phase 4 - Remedial Design (RD) and Remedial Action (RA).
is the final design and implementation of the selected remedial action alternative,
- o Phase 5 - Compliance and Verification.
is where monitoring and performance assessment programs are implemented to verify and document the adequacy of the remedial actions.

A preliminary program plan for remedial action has been developed by ER to investigate numerous sites and determine the need for remediation and appropriate corrective action. These sites are divided into 16 Operable Units (OU's) which are identified in Table 5 of the IAG and on the Figure 1-3 site map. A preliminary schedule of proposed ER milestones are presented in Tables 5 and 6 of the Federal Facilities Agreement and Consent Order of March, 1990 (IAG) Tables 5 and 6 of the IAG are included as Appendix B of this document. Tasks specified in the workplan include assessment and/or closure of spill sites, chemical storage areas, landfills,

process equipment, liquid retention ponds, underground storage sites and reservoirs.

1.6 Summary of Major Contaminants

Raw materials, waste and end products from operations at the Rocky Flats Plant create unique health hazards for workers conducting environmental restoration activities at the plant. As identified in the IAG, the primary contaminants at the site include radioisotopes, metals, inorganic and organic compounds.

Radioactive isotopes used or generated at the RFP, include plutonium, uranium, americium, tritium and related decay products, which can be present in a liquid, solid, or gaseous state. Varying levels of radioactivity are expected at many of the ER sites.

A wide assortment of metals have been and are still utilized by operations at the RFP. Metals identified in the analyses of waste processing streams include aluminum, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, lithium, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, strontium, thallium, vanadium and zinc. It is therefore possible for any or all of these constituents to be present at the ER sites designated for investigation or cleanup.

Chlorinated organic compounds, including solvents and polychlorinated biphenyls (PCBs), have been used historically in processes or equipment at the RFP. Trichloroethylene and perchloroethylene have been detected in ground water within the plant boundaries. Other chlorinated organic compounds of concern include: 1,1,1-trichloroethane, chloroform, carbon tetrachloride, 1,2-dichloroethane, dichloromethane, and methylene chloride. Non-chlorinated organic compounds, such as acetone, toluene, benzene, methyl ethyl ketone, methyl ethyl ketone peroxide, 2-butanone, xylene, bis(2-ethylhexyl)phthalate, and ethylene glycol may also

be present. Miscellaneous substances listed in the Attachment 4 of the IAG include diesel fuel, fuel oil, peroxides, asbestos, oil sludge, polyester resin, and still bottom sands. Due to the mixture of chemical contamination present, decomposition products may also be found

A variety of corrosive chemicals have been and are still being used for processing, research, development and analytical work. Groundwater, surface water or other liquids collected from the various sites may contain corrosive materials such as: sulfuric acid, nitric acid, hydrofluoric acid, sodium hydroxide, and various other nitrate, sulfate, and hydroxide containing compounds.

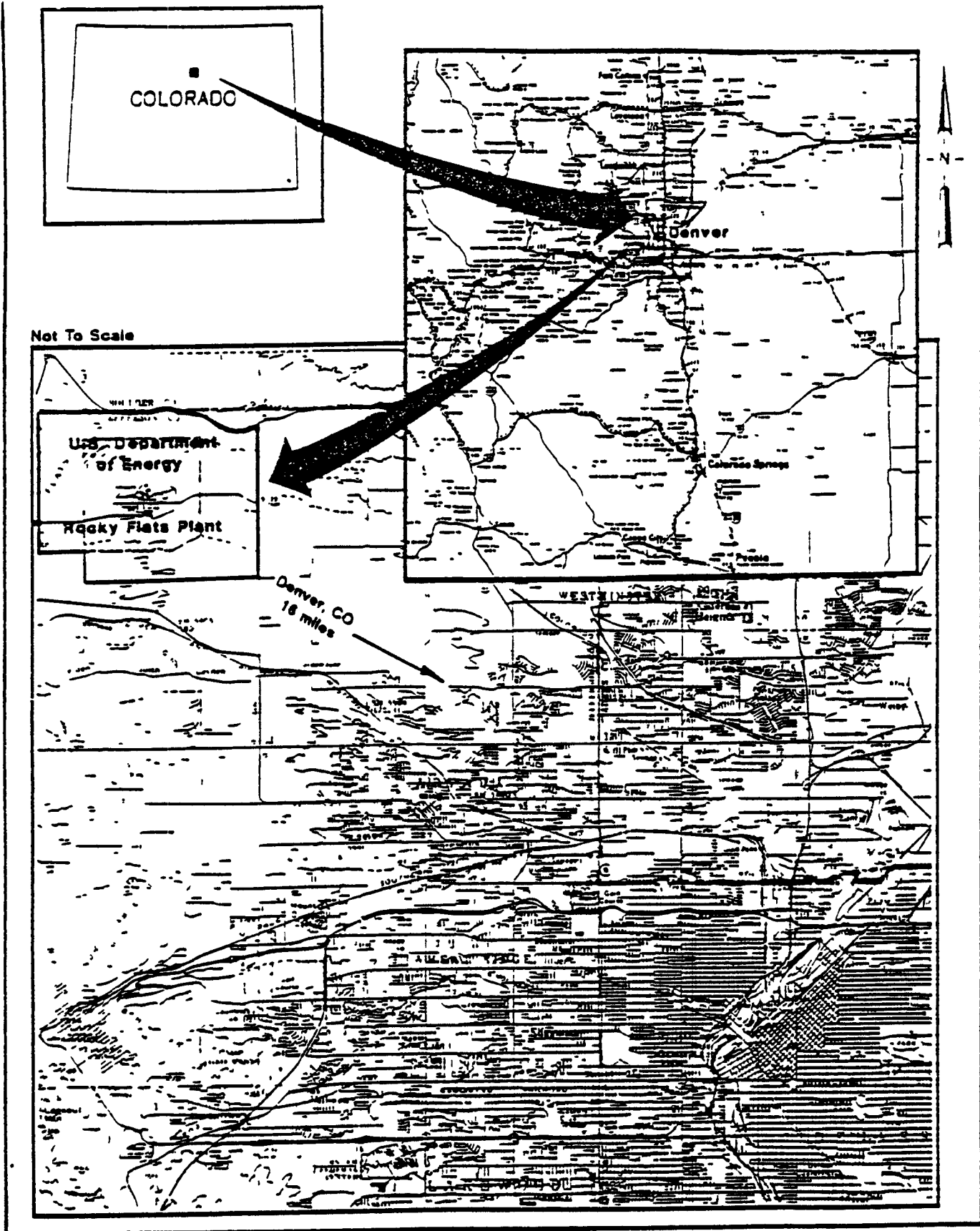


Figure 1-2: Rocky Flats Plant Site Map

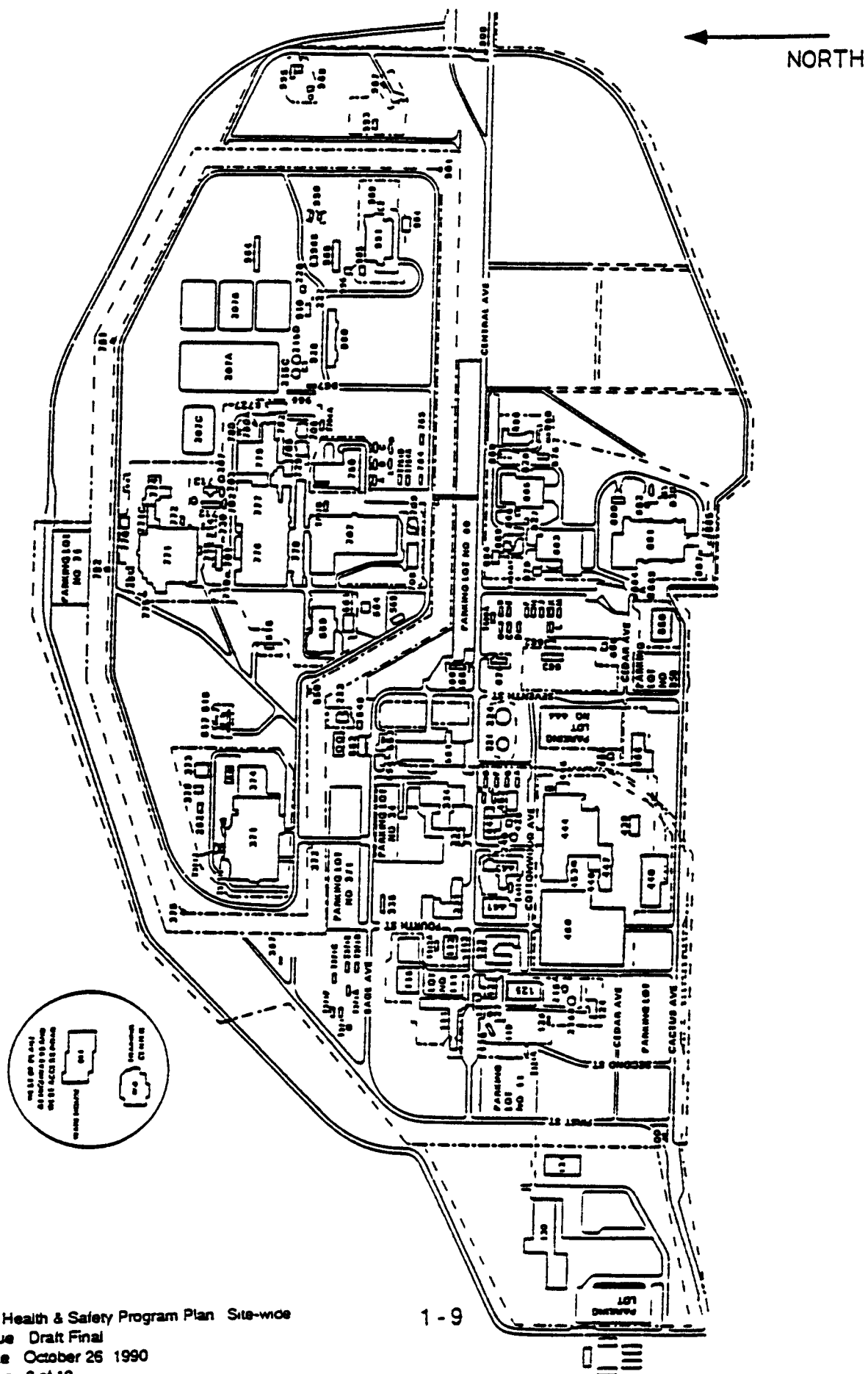
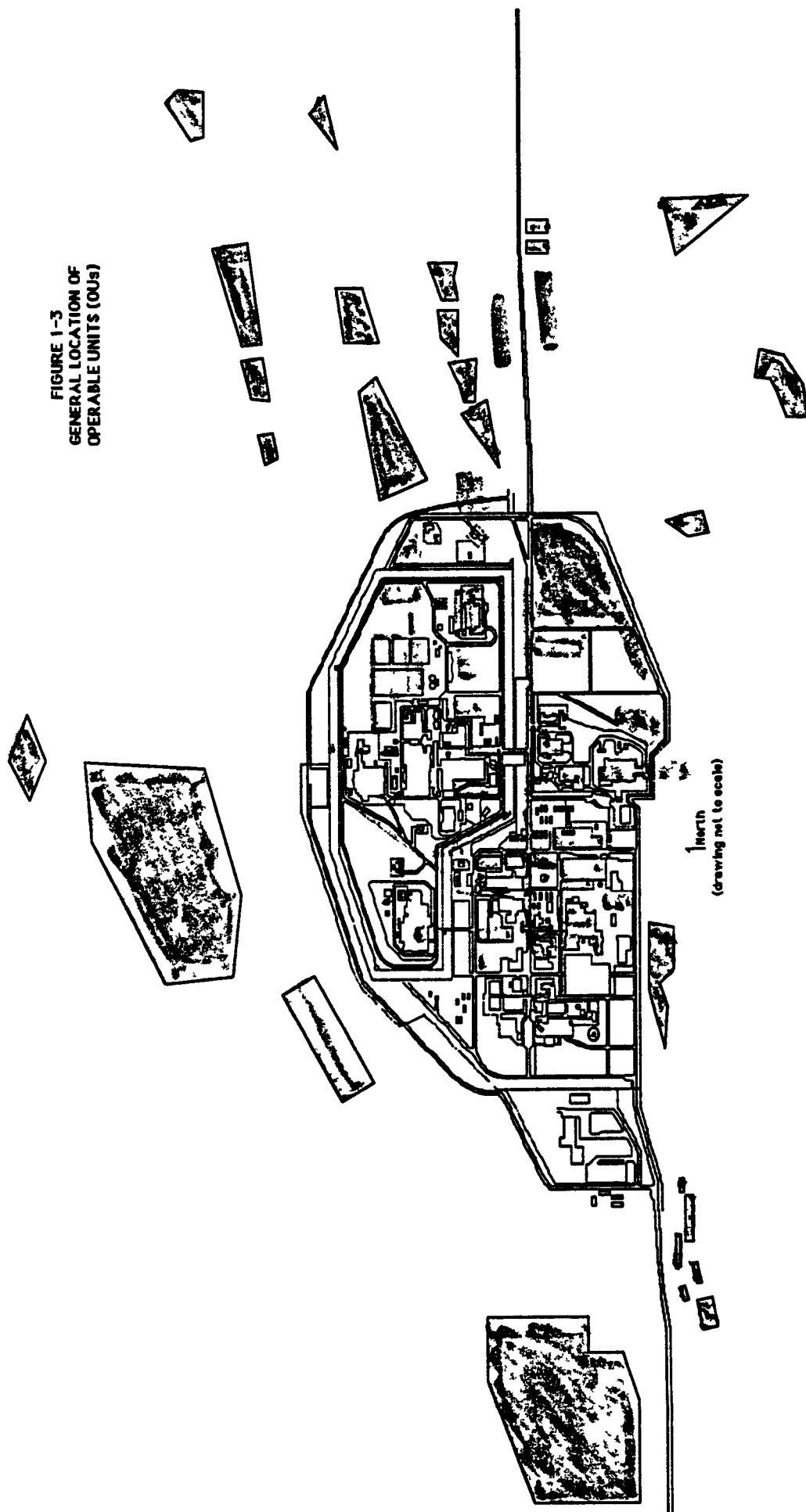


FIGURE 1-3
GENERAL LOCATION OF
OPERABLE UNITS (OUs)



CHAPTER 2

ORGANIZATIONAL STRUCTURE

2.1 Plant Organization

Environmental restoration activities at the Rocky Flats Plant (RFP) are directed by the Associate General Manager for Environmental Restoration (ER) and Waste Management (see Figure 2-1) ER Program Activities (CERCLA and RCRA response actions) involve the following ER Divisions:

- o Remediation Programs Division (RPD)
- o Environmental Monitoring and Assessment Division (EMAD)
- o National Environmental Policy Act Division (NEPA)
- o Clean Water Action Division (CWAD)
- o Clean Air and Environmental Reporting (CAER)

(See Figure 2-2 for the organizational structure of the Environmental Restoration Department.)

Health and Safety (H&S) activities at the RFP are under the direction of the Associate General Manager for Support Operations (see Figure 2-3). ER Program Activities receive support from the following H&S divisions:

- o Radiological Operations
- o Occupational Safety
- o Health and Safety Area Engineering
- o Industrial Hygiene
- o Radiological Engineering
- o Occupational Health

Facilities Engineering (FE) and Facilities Project Management (FPM) also provide support to the ER program activities. FE's role is to provide engineering designs, oversight, and management of design projects. The Project Engineer (PE) from FE directs all project design activity, ensures the user's technical requirements are met, ensures conformance with plant design standards and obtains design concurrence from RFP technical support groups (e.g., Facilities Quality Engineering, Design Verification Engineering, Fire Protection Engineering, Plant Electrical and Plant Utilities Engineering, Operations, Maintenance and Utilities Management, etc.). FPM administers the implementation of engineering designs through Construction Management (CM). CM, a branch within FPM, is responsible for assisting ER with obtaining approval for work permits for land use and work activities, and for managing/coordinating general construction contractors and their quality of work. A Construction Coordinator, identified by CM, is responsible for coordinating with various departments within the RFP to obtain permits, escorts and access justification in addition to other supporting functions, as needed by Subcontractors.

Appendix D contains a list of RFP departments or divisions that are mentioned in this Plan along with available phone numbers and contacts.

2.2 Responsibilities of Individuals

2.2.1 Division Managers

Environmental Restoration and Health & Safety division managers are responsible for managing programs and supervising project managers in the implementation of ER and H&S activities.

2.2.2 Environmental Restoration Health and Safety Officer

The Environmental Restoration Health and Safety Officer (ERHSO) is responsible for managing and implementing the ER Health and Safety Program. Environmental Restoration is responsible

for project planning, contracting, and managing ER projects, therefore, the ER HSO will ensure the a Site-specific Health and Safety Plan is written for each Operable Unit, ensure that subcontractors prepare site- or task-specific health and safety plans for approval; and provide support to project managers in the area of environmental health and safety through his/her expertise and that of the environmental support divisions

2.2.3 Remediation Programs Site Project Manager

The RP Site Project Manager is the direct line supervisor responsible for project work on a designated ER site. He/she reports directly to the RPD Manager. The RP Site Project Manager has overall control and responsibility for the management of the project, including enforcement of health and safety requirements. The Project Manager is the single-point-of-contact for implementing ER's needs and requirements through the Project Administrator

2.2.4 Health & Safety Liaison Officer

The H&S Liaison Officer is assigned from the Occupational Safety Division to the Environmental Restoration Division to serve as the central point-of-contact for supporting the ER Program for all operational health and safety needs. The H&S Liaison Officer reports to the Occupational Safety Division Manager and interacts directly with the ER Site Project Managers and the ER Health and Safety Officer. He/she also supervises the EG&G Site Health and Safety Coordinators. The H & S Liaison Officer has the following responsibilities:

- o Coordinates health and safety activities with the ER H&S Officer and the ER Site Project Managers
- o Implements the HSPP by providing and supervising EG&G Site Health and Safety Coordinators at each designated ER site
- o Prepares EG&G Health and Safety Plans (HSPs)

- o Coordinates approval of Site-specific (Task-Specific) Health and Safety Plans prepared by Subcontractors and their lower-tier subcontractors with all health and safety disciplines
- o Performs periodic health and safety audits and inspections of the subcontractor health and safety programs, and program documentation

2.2.5 Site Health and Safety Coordinator

A Site Health and Safety Coordinator (SHSC) will be assigned from the Health and Safety Department by the Health & Safety Liaison Officer to oversee Health and Safety Plan implementation at each Operable Unit. The SHSC will report to the H&S Liaison Officer and will keep the RP Site Project Manager informed of health and safety related activities on the site. The SHSC has the following responsibilities:

- o Oversees EG&G and subcontractor work to ensure that the requirements and principles of this HSPP and the Site Specific HSPs are followed,
- o Performs audits for proper and appropriate use of PPE, monitoring and decontamination procedures, access control and required documentation,
- o Alerts the ER Site Project Manager and the H&S Liaison Officer of health and safety violations at the ER remedial project work site,
- o Coordinates with appropriate health and safety divisions to provide for radiation monitoring, medical surveillance, emergency response, industrial hygiene support and H&S engineering support,
- o Provides on-site health and safety support at all times for tasks performed by EG&G employees beyond project management and oversight.

FIGURE 2-1

EG&G ROCKY FLATS
ORGANIZATION

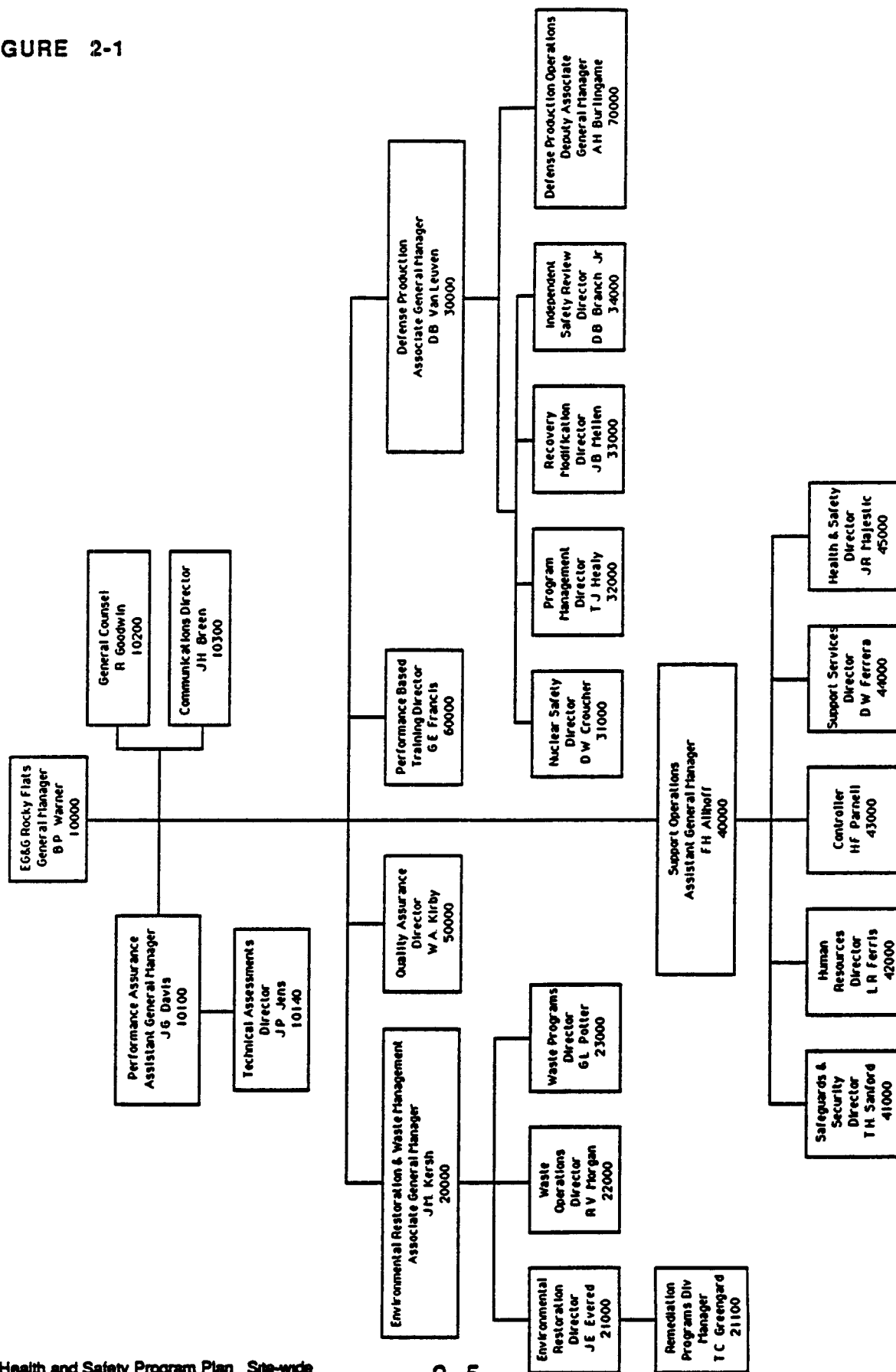


FIGURE 2-2

ENVIRONMENTAL RESTORATION

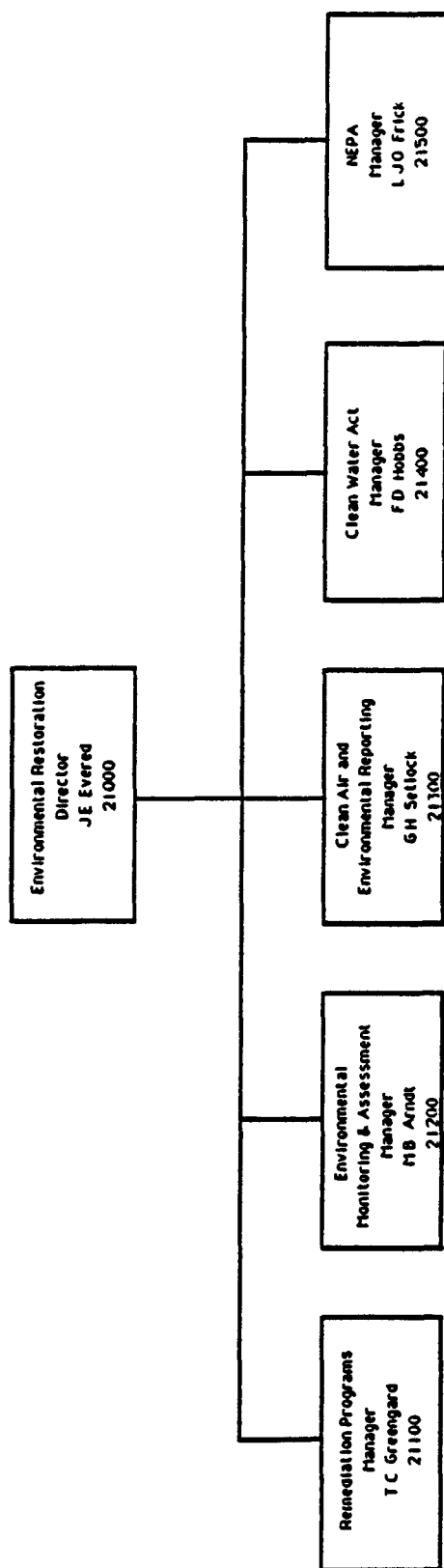
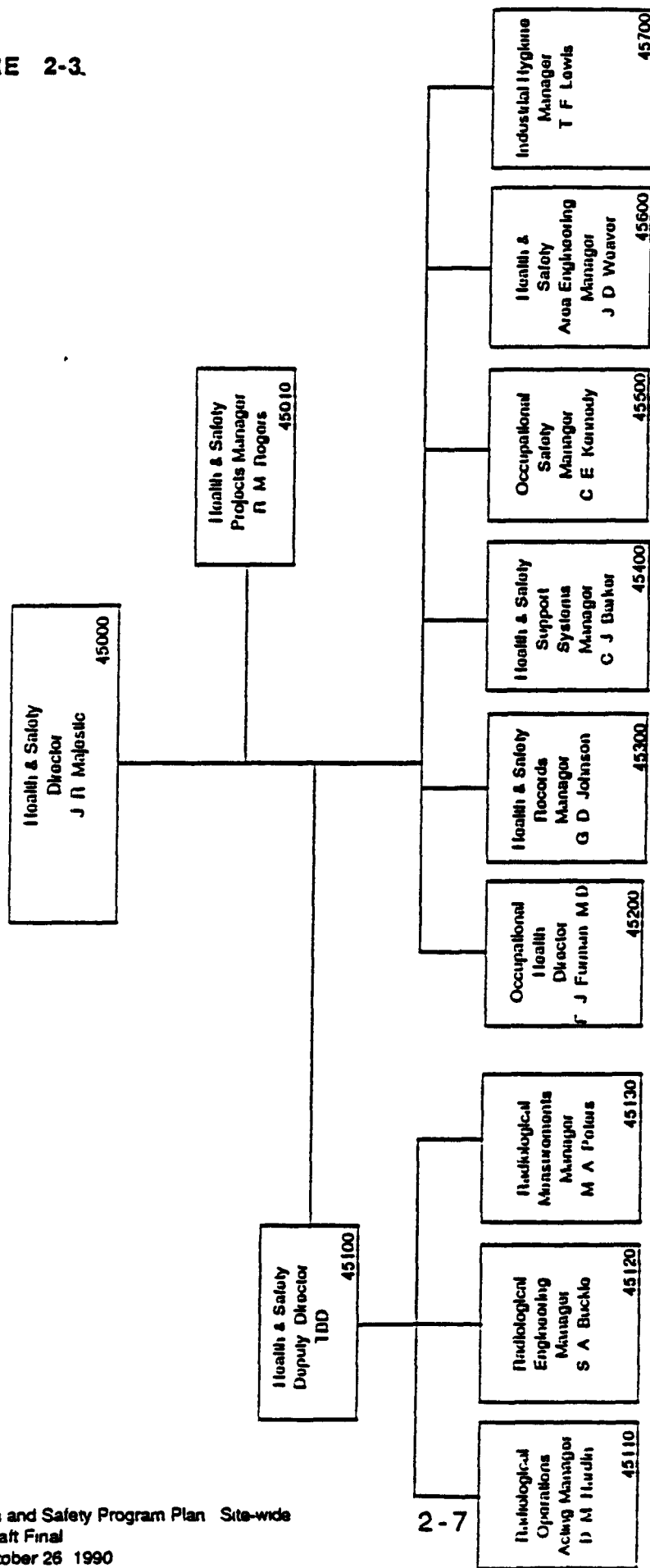


FIGURE 2-3.

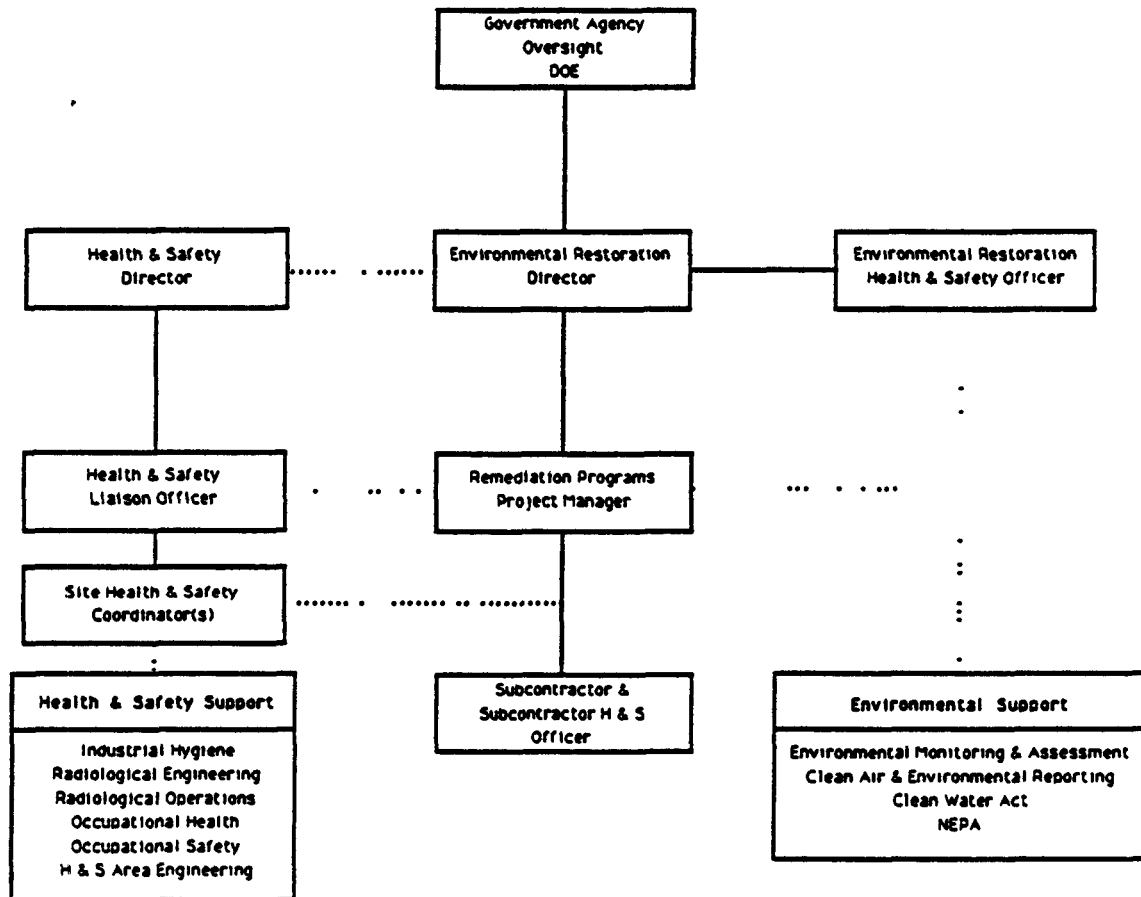
HEALTH AND SAFETY



2-7

FIGURE 2-4

RP PROJECT ORGANIZATIONAL CHART



CHAPTER 3

SITE HEALTH AND SAFETY PLANS

3.0 Overview

This chapter section describes material that is to be incorporated into all Site Health and Safety Plans (subsequently referred to as the "Site Plan"), and explanations as to how the Site Plan is to be used. Section 3.1 describes the application of a Site Plan. Section 3.2 presents the necessary components of the Plan. Section 3.3 describes the procedures to be followed for conducting program audits. Section 3.4 describes the review and approval process for site plans.

A separate Site Health and Safety Plan Workbook has been prepared to aid EG&G and subcontractor personnel in developing their site plans. Although every attempt has been made to include the descriptions and procedures required for each situation encountered in the field, circumstances will undoubtedly arise that are not covered in the workbook. The workbook is a guide that subcontractors may use to prepare site-specific health and safety plans.

3.1 Application

A Site Plan is required for each project that falls under the scope of the OSHA Regulations for Hazardous Waste Sites as stated in 29 CFR 1910.120 (a)(1). At Rocky Flats, such sites are determined by the Environmental Restoration and Waste Management Department. EG&G will develop an overall Site Plan for each of the 16 Environmental Restoration Operable Units. All subcontractors are required to develop a site specific Health & Safety Plan of their own which addresses the tasks they will be performing and meets the requirements of OSHA 1910.120. EG&G Site Plans and all related information discussed in this document will be provided to subcontractors to assist them in preparing their site plans. Once approved by EG&G, and other approving authorities such as DOE, the elements of the Site Plan shall dictate the health and safety activities of all workers and visitors falling within its scope.

3.2 Health & Safety Plan Components

The Site Plans used at Rocky Flats must address the following items as a minimum

- o safety and health hazard assessment
- o a safety and health risk analysis for each site task and operation
- o key personnel assignments
- o employee training assignments
- o specified personal protective equipment per task
- o medical surveillance requirements
- o site control measures
- o personnel and site monitoring requirements
- o decontamination requirements and techniques
- o emergency response plans
- o confined space entry procedures, if applicable
- o spill containment contingencies
- o background of the project including scope of work, site history, anticipated duration of work, worker classifications, government agency involvement and approval documentation

The required elements of the Site Plan are described in greater detail in the EG&G Site Health and Safety Plan Workbook (Appendix A). Plans deficient in one or more of these elements will not be approved by EG&G.

Contractors may also be required to provide Operational Safety Analyses (OSAs) or Job Safety Analyses (JSAs) for tasks not covered by existing EG&G procedures. An OSA is a written safety procedure which outlines the safety hazards involved in an operation, methods of controlling those hazards, and the responsible personnel. A JSA is a safety analysis of a specific task not

previously or routinely done. A representative of the Health and Safety Area Engineering or Occupational Safety Department will review the need for JSA and OSA development during the Site Plan review. Once developed the OSA or JSA will need to be approved by the Health & Safety Liaison Officer and will become an auditable part of the Site Plan. Instructions for the development of a JSA are provided in Chapter 2.11 of the EG&G HSP Manual.

Standard Operating Procedures applicable to health and safety that have been prepared for environmental restoration activities include:

- o Rocky Flats Plant Access and Control 1 12
- o Personnel Decontamination 1 2
- o General Equipment Decontamination 1 3
- o Heavy Equipment Decontamination 1.14
- o Handling of Personnel Protective Equipment (PPE) 1 6
- o Handling of Decontamination Water and Wastewater 1 17
- o Field Communications 1 11
- o Field Radiological Measurements 1.16
- o Handling of PIDs and FIDs 1.15

Subcontractors are required to follow all applicable ER SOPs.

3.3 Program Audits

All Site Plans implemented at Rocky Flats are subject to inspection by DOE, EPA, OSHA, CDH, EG&G, and other agencies with regulatory authority over the site. Such inspections may include, but are not limited to, the items described in Table 3-1. The intent of the audit process is to verify the implementation of the plan and to evaluate its effectiveness in protecting the health and safety of workers, visitors and the surrounding population. The EG&G Site Health & Safety Coordinator will evaluate the effectiveness of the plan and worker performance on a daily basis while performing his or her regular field duties. Any necessary corrections that need to be made shall be documented and implemented through the authority of the Project Manager.

Corrective action and daily activity reports will be kept in a site journal and weekly summary reports will be provided to the ER Health & Safety Officer and the Health & Safety Liaison Officer. The Health & Safety Liaison Officer will ensure that at least monthly, independent and unannounced audits of the site are conducted to verify site and worker compliance with the plan and all applicable regulations.

3.4 Review and Approval

Review procedures for Site Plans developed for EG&G personnel and for Site Plans developed by Subcontractors will be similar. All plans must meet the requirements of OSHA 1910.120, DOE orders, and Rocky Flats standards and policies. Subcontractors will also be held accountable for any additional health and safety requirements identified in their contract. The Health and Safety Liaison Officer shall coordinate the plan approval process with the appropriate divisions within the Health and Safety Directorate, The Fire Department, and Environmental Restoration.

3.4.1 Subcontractor Health & Safety Plan Review

The Subcontractor is required to submit a site-specific health and safety plan to the Health and Safety Liaison Officer three weeks prior to the initiation of field work. Ten copies, identified as "DRAFT", must be submitted. The scope of the project will dictate which departments will need to review the Plan. The H & S Liaison Officer will distribute the Plan to the appropriate reviewing departments listed in Figures 3-2 and 3-3 of this document. Other divisions may be required to review the Plan when appropriate. Reviewers will have one week to identify deficiencies in the Plan. The Environmental Restoration Health and Safety Officer will consolidate comments and return the Plan to the Subcontractor for corrections. The Subcontractor will have one week to make corrections and resubmit the Plan with the corrections documented (see Figure 3-1 for correction form). The ER H&S Officer and the H&S Liaison Officer will review the changes for completeness and may resubmit the plan to the appropriate division(s) for additional review if necessary.

3.4.2 EG&G Health & Safety Plan Review

EG&G Site Plans will either be generated internally or subcontracted to an outside consultant. The generator of the Plan will be required to submit ten copies of the Site Plan to the Health & Safety Liaison Officer three weeks prior to the initiation of field work. The H & S Liaison Officer has the responsibility of informing consultants of the required deadlines for draft and final submittals. The H & S Liaison Officer will distribute the Plan for in-house review. Reviewing departments include Environmental Restoration, Radiological Operations, Industrial Hygiene, Radiological Engineering, Health and Safety Area Engineering, Occupational Safety, Occupational Health and the Fire Department. Other departments may be required to review the Plan when appropriate. Reviewers will have one week to identify deficiencies in the Plan. The Plan will then be returned to the generator for corrections. The generator will have one week to make corrections and resubmit the plan with the corrections appropriately documented (see Figure 3-1 for correction form). Once satisfied with the corrections, the representatives of the reviewing divisions will sign off on the plan to document that they "have reviewed the Plan and agree that it meets their requirements and is technically correct (see figure 3-3). Final EG&G approval of site specific health and safety plans will be done by the Director of Environmental Restoration, the Director of Health and Safety, the Environmental Restoration Health and Safety Officer and the Health and Safety Liaison Officer (see Figure 3-2). The ER Health & Safety Officer will then submit a Final Draft copy of the Plan to DOE for their approval.

TABLE 3-1

SITE HEALTH & SAFETY AUDIT

1. Is the written site plan on-site and available to workers?
Y N
2. Are the site safety and health hazards adequately identified?
Y N
3. Have the required OSAs and/or JSAs been prepared and implemented?
Y N
4. Does the site plan identify the full scope of work, its anticipated duration, the site history, and government agency involvement?
Y N
5. Have the key site personnel and their respective responsibilities been identified?
Y N
6. Are training records available for each on-site worker?
Y N
7. Are medical fit-for-duty records available for site workers?
Y N
8. Is the air monitoring equipment designated in the site plan being used?
Y N
9. Is air monitoring equipment properly calibrated based on observation and calibration records as stipulated in the site plan?
Y N
10. Are air monitoring surveys conducted as described in the plan?
Y N
11. Have conditions and/or tasks changed significantly since the last site hazard analysis?
Y N
12. Have workers been properly trained and are they familiar with the personal protective equipment required for the tasks they are performing in aspects such as its use and techniques for inspecting, donning, doffing and decontaminating prior to project commencement?
Y N

Table 3-1, continued

- | | |
|-----|--|
| 13 | Is the site properly posted and secured from unauthorized entry? |
| Y | N |
| 14 | Are decontamination techniques properly performed and verified? |
| Y | N |
| 15 | Are workers familiar with the emergency response plan and has it been rehearsed? |
| Y | N |
| 16 | Are the appropriate levels of PPE being utilized as stipulated in the plan? |
| Y | N |
| 17 | Are spill containment supplies readily available? |
| Y | N |
| 18 | Have special procedures and protocols for activities such as confined space entries been developed and approved and are they being followed? |
| Y | N |
| 19. | Is the Work Permit properly filled out and posted? |
| Y | N |
| 20 | Are workers capable of answering basic questions regarding the characteristics and hazards of their job and the contaminants present at the site? |
| Y | N |
| 21 | Are hazardous wastes associated with decontamination properly contained and labeled? |
| Y | N |
| 22. | Do employees know where Material Safety Data Sheets (MSDS) are located in their work areas and have they been trained in accordance with the OSHA Hazard Communication Standard? |
| Y | N |
| 23 | Have the radiological hazards been appropriately addressed and is there adequate radiological monitoring equipment and support available for the project? |
| Y | N |

FIGURE 3-1: CORRECTION FORM

Document Name: _____

Reviewer: _____

Department: _____

Building Number. _____

Date: _____

Phone Number / Pager Number: _____

ORIGINAL STATEMENT (include page number,
section number, location in paragraph)

CORRECTION

FIGURE 3-2
ENVIRONMENTAL RESTORATION HEALTH & SAFETY PROGRAM PLAN
REVIEW AND APPROVAL

Director of Environmental Restoration

Date

Director of Health & Safety

Date

Health & Safety Liaison Officer

Date

Environmental Restoration Health & Safety OfficerD

Date

FIGURE 3-3
REVIEWING DEPARTMENTS APPROVAL FORM

The following signatures document that the respective departments have reviewed the Site Specific Health and Safety Plan and agree that requirements which are managed at the RFP by their departments are believed to be technically correct.

Environmental Restoration Representative

Date

Occupational Safety Representative

Date

Industrial Hygiene Representative

Date

Radiological Engineering Representative

Date

Radiological Operations Representative

Date

Health & Safety Area Engineering Representative

Date

Occupational Health Representative

Date

Fire Protection Representative

Date

CHAPTER 4

TRAINING

4.0 Introduction

The purpose of the health and safety training program is to provide the knowledge and skills needed to safely perform required tasks in potentially hazardous environments, utilize protective equipment to prevent exposures or injury, and to anticipate, identify, and react to unplanned or potentially dangerous situations.

The training requirements established for workers at Rocky Flats vary based on the classification of the site, the workers' assigned task, the respiratory protection requirements for a project, and a workers' job classification. Section 4.1 describes the training requirements and course content for anticipated operations. Section 4.2 addresses the criteria for approved courses and methods of obtaining training. Section 4.3 describes EG&G methods of evaluating trainees' performance. Section 4.4 describes verification of worker training and Section 4.5 addresses documentation.

4.1 Training Requirements & Course Content

4.1.1 Initial Hazardous Waste Site Health & Safety Training

In accordance with OSHA Regulation 29 CFR 1910.120 (e)(3)(i-iv), any individual who is assigned to work within an ER hazardous waste site, as defined by the scope of this document, must first complete a hazardous waste health and safety course. A minimum of either 24 or 40 hours of classroom training is required, based on the type of site and the workers' assigned

responsibilities (see Table 4-1). The 40 hour course is mandatory for those workers who are required or may be required to use respiratory protective equipment on a hazardous waste site. The 40 hour course is defined in this manual as a Class I requirement. Workers who are assigned tasks on these sites, but work in level D protective clothing ensembles without level C contingencies are required to have a minimum of 24 hours initial hazardous waste health and safety training. The 24 hour course is defined as a Class II requirement. Workers may have their training upgraded from Class II to Class I status by obtaining an additional 16 hours of training, provided it meets EG&G's and OSHA's training requirements.

Supervisors of hazardous waste sites or of tasks conducted on hazardous waste sites must have, as a minimum, the same baseline training (40 or 24 hours) as those workers being supervised plus an 8 hour advanced supervisor health and safety course.

All hazardous waste workers (Class I and II) must receive an 8 hour refresher course annually. Workers will not be permitted on site until the refresher training requirement is met.

Table 4-1 summarizes the initial hazardous waste health and safety training requirements. The EG&G Health & Safety Liaison Officer should be contacted for clarification of the level of training required of workers on specific projects.

A current outline of the major subjects covered in the EG&G 40 and 24 hour Hazardous Waste Workers Health & Safety Course, is included in Table 4-2. The two courses are identical except that the 24 hour course does not include field exercises. The refresher course is an in-depth review of the initial training course material. Table 4-3 describes the content of the current EG&G supervisor course.

4.1.2 Basic Radiation Safety Training

All EG&G personnel and subcontractors working on ER remedial project sites will take the Radiation Safety course offered by the EG&G training department. The course is a Computer Based Training course (CBT) which is self-paced and takes approximately one hour to complete. Workers who are assigned to work in areas where radioactive materials are present will be required to take the two day Radiation Worker training course provided by EG&G so that they understand the potential radiation hazards and the methods that will be used to minimize them such as by using proper work practices and protective equipment and the methods used to monitor radiation hazards by using devices such as field survey instruments and personal dosimeters.

4.1.3 Site-Specific Hazardous Waste Site Training

In accordance with OSHA regulation 29 CFR 1910.120 (e)(3)(i-iv), workers on uncontrolled hazardous waste sites must also receive site specific training. The required length of this training ranges from 1 to 3 days depending on the worker category as delineated in table 4-1. This training shall be coordinated through the ER Site Project Manager and reviewed and approved by the Health and Safety Department, and shall address all sections of the Site Plan, associated SOP's, OSA's and JSA's, and any additional building or site indoctrination in enough detail so that site personnel can safely perform their assigned tasks. Subcontractors must provide the same level training to their employees and their training records will be audited by the EG&G Health and Safety Department.

4.1.4 Hazard Communication Training

Hazard communication training shall address the hazards associated with the commercial chemical products used on an ER site in addition to DOE and Rocky Flats Plant standards. Basic

Hazard Communication training is provided through a Computer Based Training course available on plant site which is self-paced and takes approximately one hour to complete. Table 4-4 describes the content of the EG&G hazard communication program. Training on specific chemicals is to be conducted during the site-specific training, once the chemicals to be used have been identified. Subcontractors must institute a Hazard Communication training program for their employees and address the site hazards in their site-specific training program. The EG&G Site Health & Safety Coordinator will ensure that the Hazard Communication Program for both EG&G as well as subcontractor employees is properly implemented and that hazardous chemical information is appropriately disseminated between all worker groups on the site.

4.1.5 Rehearsal of Emergency Response Plan

OSHA 29 CFR 1910.120 requires periodic rehearsal of the Emergency Response Plan. The ER Health and Safety Officer shall coordinate these rehearsals during the project activity start-up period, which shall be formally documented and used to evaluate the effectiveness of the Emergency Response Plan. The ER Health & Safety Coordinator will coordinate rehearsals with subcontractors so that both EG&G and subcontractors are prepared in the event of an emergency. An emergency response rehearsal will be held for each major ER site and will be coordinated to include all long-term subcontractors. Short-term subcontractors will receive a briefing detailing the specific requirements of the emergency response plan if they are not on site when rehearsals are held.

4.1.6 Visitor Briefings

All visitors requiring access to an ER remedial work site shall have orientation prior to gaining access to the site. The completion of this training does not allow the visitor into controlled areas of the ER site. This training is designed to provide sufficient information on site hazards and utilized control measures at the ER remedial project site to prevent the

visitor from violating any safety requirements. While at the ER remedial project work site, visitors shall be escorted by a trained worker or supervisor at all times

4.1.7 Tailgate Safety Meetings

"Toolbox" or "tailgate" safety meetings shall be conducted daily or as necessary by the respective Site Health and Safety Coordinators. Meetings need not be lengthy or elaborate, but must be sufficient to cover the health and safety issues relevant to the day's tasks. Relevant topics for these meetings shall include:

- o health and safety considerations and necessary protective equipment for current operations,
- o any revisions to the Site Plan (EG&G or subcontractor),
- o any new MSDS forms filed on the ER remedial project work site,
- o all documented and/or observed unsafe acts committed on the ER remedial project work site since the previous meeting, a clarification of the safety requirements violated, and methods to prevent recurrence, and
- o other topics as specified in EG&G Health and Safety Practices Manual, Chapter 2.01 (on-the-job safety, area hazards, fire reporting and response, eye washes/safety showers, decontamination protocols, nuclear safety, etc)

All workers are required to attend the meetings and sign an attendance sheet attached to the meeting minutes. Meeting minutes will be documented on Form RF-7060, Safety Summary Report, contained in the EG&G Health and Safety Practices Manual and as figure 4-5 of this document. The SHSC shall follow up with absentees by reviewing the meeting minutes with them

and having them sign the attendance sheet. The SHSC shall ensure that minutes and attached attendance sheets are completed and distributed to the ER Health and Safety Officer. Minutes of the meetings shall be retained on file at the ER remedial project work site and archived following project completion. Upon request, such records will be made available to inspecting officials.

4.1.8 Additional Health & Safety Training Programs

EG&G provides a variety of specialized training programs for site workers which are dictated by the worker's specific assignment. Table 4-5 summarizes some of these courses.

4.2 Implementation of Training

Training for EG&G personnel is provided by the EG&G Training Department. Most training is conducted in-house with the assistance of various EG&G health, safety, and environmental groups. Some training is provided through agreements with academic organizations and subcontractors. The Manager of Plant General Employee Training is the point of contact for EG&G training course availability. The manager can be reached at 966-7706.

The training of subcontractors for work planned at Rocky Flats is the responsibility of the subcontractor. Training must meet the performance requirements of EG&G and OSHA. EG&G provides Computer Based Training (CBT) for subcontractor personnel covering specific topics. The following CBTs are available and may be required depending on the potential hazards at specific sites: Respirator Indoctrination (required before fit tests), Radiation Safety, Industrial Safety, Industrial Hygiene, Waste Minimization, Quality Assurance, Fire Protection, Security and Emergency Planning. Respirator fit tests will be provided by EG&G for all

subcontractor personnel who may be required to wear respirators while working on ER sites. Industrial Hygiene is responsible for the respirator program. Coordinate fit tests through IH at 966-6627 or 966-6628.

4.3 Performance Evaluations

The training requirements, described in this chapter, are designed to teach skills and knowledge applicable to field work. The workers and supervisors are held accountable for learning and applying these basic skills and concepts. EG&G shall evaluate workers' abilities through the administration of tests in training courses and through field performance evaluations. The training department has established testing procedures and minimum score requirements for examinations given in training courses. The Site Health & Safety Coordinator shall conduct field audits to evaluate health & safety skills. The Health & Safety Liaison Officer will ensure that unannounced audits are done at least monthly. Below average performance on examinations or field skill evaluations shall be reported to the employee's supervisor. Retraining and subsequent demonstration of adequate skills may be required by the Liaison Officer.

4.4 Verification of Training

All EG&G personnel, agency representatives and subcontractors must obtain laminated badges documenting training for each assigned individual prior to beginning field work. Laminated badges will be provided by EG&G. Subcontractors can obtain the badges at Building 060. Appointments can be scheduled by calling Plant General Employee Training at 966-6318. The laminated badges must be worn at all times when accessing or working in a location where the training is required.

4.5 Training Records

All health and safety training, conducted by EG&G, shall be documented as required by the EG&G Training Department. All training records for EG&G personnel will be maintained by the training department in accordance with 29 CFR 1910.120. Successful completion of the training specified in this section and document verification of completion by the SHSC, is required for all employees prior starting work at ER remedial sites. Signature verification is required to document that workers and supervisors have read, understood, and will comply with all requirements stated in the HSPP and H&SP applicable to the ER remedial project site

Table 4-1
Training Requirements of 29 CFR 1910.120
and associated EG&G Training Classifications

<u>Population</u>	<u>Initial Training</u>	<u>Annual Refresher Training</u>	<u>Certification By Whom</u>
<u>Class I</u>			
<u>General Site Workers</u>			
Laborers	40 hrs off-site	8 hours	Instructor or head instructor and trained supervisor
Equipment Operators	3 days OJT		

qualified for level B, C, or D PPE use)

<u>Class I-S</u>			
<u>Supervisors</u>			
	40 Hrs off-site	8 hours	Instructor or head instructor and trained supervisor
	3 days OJT		
	8 hrs advanced		

(Directly responsible for work performed by Class I workers)

<u>Class II</u>			
<u>Hazardous Waste Site Workers with Limited Exposure</u>			
	24 hrs off-site	8 hours	Instructor or head instructor and trained supervisor
	1 day OJT		

Limited Tasks
Unlikely to be exposed above PEL
No Respirators
No Emergencies
Site fully characterized

<u>Class II-S</u>			
<u>Supervisors</u>			
	24 hrs off-site	8 hours	Instructor or head instructor and trained supervisor
	1 day OJT		
	8 hours advanced		

(Directly responsible for work performed by Class II workers)

Emergency Response	May be included in training listed above, prior to responding to emergencies	8 hours	Instructor or head instructor and trained supervisor
-----------------------	--	---------	--

Figure 4-1
EG&G HAZARDOUS WASTE WORKERS
HEALTH AND SAFETY COURSE OUTLINE

- Module 1:** Description of Lessons and Instructional Objectives
- Module 2:** Introduction
- Module 3:** Review of Regulations
- Module 4:** Definitions
- Module 5:** Sources of Hazard Information
- Module 6:** Hazards in the Work Environment
- Section 1: Chemical Hazards
 - Section 2: Compressed Gases
 - Section 3: Ionizing Radiation
 - Section 4: Heat Stress
 - Section 5: Cold Stress
 - Section 6: Confined Space
 - Section 7: Safety Hazards
 - Section 8: Noise
 - Section 9: Biological Hazards (to be developed)
- Module 7:** Generic Site Safety Plan
- Module 8:** Incident Command
- Module 9:** Medical Surveillance
- Module 10:** Toxicology
- Module 11:** Site Control, Characterization and Monitoring
- Module 12:** Personal Protective Equipment

Figure 4-1 (continued)

Module 13:	PH Acid/Bases
Module 14:	Decontamination
Module 15:	Spill Response
Module 16:	Level C & B Exercises¹

¹The 24 hour course does not include Level C or B Exercises

Figure 4-2

SUPERVISOR TRAINING COURSE OUTLINE

Manager and Supervisor Responsibilities

1. Worker 24 Hour On-The-Job Training
2. Work Site Characterization
3. Pre-emergency Planning
4. Selection of Proper PPE
5. SARA Title III
6. Legal Aspects of Supervision
7. Potential Problem Analysis
8. Remedial Action - Lessons Learned

Figure 4-3

HAZARD COMMUNICATION TRAINING COURSE OUTLINE

Course Content:

- o OSHA, DOE, and Rocky Flats standards and policies on hazard communication
- o Hazardous material evaluation responsibilities
- o The warning labels used at Rocky Flats
- o Material Safety Data Sheets (MSDS)
- o How to obtain hazard information

Course objectives are to train the employee to:

- o describe the OSHA, DOE and Rocky Flats Hazard Communication policies,
- o identify the agencies responsible for hazardous material evaluation,
- o interpret a Rocky Flats warning label,
- o describe the contents and uses of MSDS, and
- o list several different sources from which to obtain hazard information.

Figure 4-4

GENERAL TRAINING PROGRAMS

<u>COURSE NAME</u>	<u>CURRICULUM</u>	<u>COURSE NUMBER</u>	<u>FREQUENCY</u>
Respirator Certification	056	284	Annually
Beryllium Operations	056	286	Biannually
Industrial Safety	023	429	One Time
RCRA Classroom	023	435	Annually
RCRA On-The-Job-Training	018	442	Annually
Radiation Safety	023	476	Biannually
TRU Waste	023	592	Biannually
Low-Level Waste	023	692	Biannually
Com Sec Officer	079	594	Biannually
Com Sec User	079	595	Biannually
Nuclear Materials Safeguards	038	597	Biannually

Figure 4-5

SAFETY SUMMARY REPORT

TO ADMINISTRATIVE MANAGEMENT _____
 (NAME / DEPARTMENT)
 FROM OPERATIVE MANAGEMENT _____
 (NAME / GROUP)
 DATE _____
 SAFETY ACCOUNTABILITY REPORT FOR _____
 (MONTH / QUARTER)

A. SAFETY MEETINGS. 1. Date: _____ 2. Length: _____ 3. # Present: _____ 4. Agenda / Topics: _____ PSC Minutes: _____ Accidents / Investigations: _____ _____ Inspections: _____ _____ HSE Manual procedures: _____ _____ Special Topics: _____ _____ Concerns / Status: _____ _____ _____ Other (e. g. Security) _____ _____ _____	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%; padding: 5px;"> <u>List those missing:</u> (Attach signed list of attendees) </td> <td style="width: 50%; padding: 5px;"> <u>Follow-up signature / Date</u> </td> </tr> </table>	<u>List those missing:</u> (Attach signed list of attendees)	<u>Follow-up signature / Date</u>
<u>List those missing:</u> (Attach signed list of attendees)	<u>Follow-up signature / Date</u> 		
B. LOSS STATISTICS. 1. # Injuries Reported to Medical _____ # Late Reports: _____ 2. # Accidents Investigated _____ 3. Investigation Summary <u>CAUSES</u> <u>CORRECTIVE ACTIONS</u> _____ _____ _____ _____ 4. Other Incidents. _____			
C. OTHER SAFETY ACTIVITIES (e.g., Job / Building Indoctrinations, Individual Contacts, On the job safety Training) _____ _____ _____			

RF 7060 (8/79) (USE REVERSE SIDE AS NECESSARY)

CHAPTER 5

MEDICAL SURVEILLANCE

5.0 Introduction

The Occupational Health Department, under the direction of the Occupational Health Director, is responsible for the Rocky Flats Plant Medical Surveillance Program. The Medical Surveillance Program is designed to detect early signs of adverse health effects from chemical, radiological and physical hazards on the Rocky Flats Plant site and to facilitate protective measures. Qualified occupational medicine physicians conduct the required medical surveillance.

The Occupational Health Department provides, at no cost to the employee and without loss of pay, comprehensive physical examinations to all EG&G employees. The exams are used to assess the health status and physical fitness of employees and to ensure that work assignments do not exceed employee's physical capabilities.

The medical surveillance requirements stated in the Hazardous Waste Operations and Emergency Response Standard [29 CFR 1910.120 (f)] provide the framework for a medical monitoring program to be used for hazardous waste site workers. The standard includes the requirement that baseline, periodic, and termination medical examinations be performed and documented. It also requires that the following employee categories be covered: employees who may be exposed to hazardous substances at or above the permissible exposure limit or published exposure limit for 30 days or more per year; employees who wear respirators for more than 30 days per year; and employees who develop symptoms of overexposure. Because of the potential hazards associated with environmental restoration projects, all EG&G site personnel will be required to participate in a medical surveillance program.

5.1 Subcontractor Medical Surveillance Program

Subcontractors are responsible for providing and implementing a medical surveillance program for their personnel participating in remedial project work at the Rocky Flats Plant. The

subcontractor medical surveillance program must meet all of the requirements of this program plan, 29 CFR 1910.120(f), DOE orders and RFP policies and standards

Subcontractors working at environmental restoration sites will be provided with a copy of the EG&G Site Plan for the Operable Unit in which they will be working. Chemical and radiological hazards that have been identified at the site will be discussed in the Hazard Assessment section of the Site Plan. This document will be a valuable source of information for identifying potential site contaminants but due to the limitations of some of the past investigative studies only minimal data may be available. Whatever information is available at the time, however, should be provided to the consulting physician so that they understand the scope of work and the extent of the investigation.

Subcontractors subject to the requirements of 1910.120(f)(2) must have baseline physical examinations prior to working on the site. The baseline examination must be current, i.e., within the last twelve months, and must include appropriate baseline chemical and radiological bioassays. Subcontractors are required to maintain copies of "fit-for-duty" records, signed by the consulting physician, for all personnel participating in the medical surveillance program which includes a statement as to whether or not the employee is medically qualified to wear a respirator. The Site Health & Safety Coordinator will assure that the appropriate medical surveillance documentation is on file at the remediation site office prior to the commencement of work. The records must be available for audit by RFP and authorized regulatory agency personnel upon request.

5.2 EG&G Medical Surveillance Program

EG&G personnel assigned to work at Environmental Restoration Sites will be identified to the Occupational Health Department by their supervisor. In addition, a copy of the hazard assessment from the EG&G Site Plan, for the site to which they are assigned, shall be provided to the Occupational Health Department. Based on environmental, industrial hygiene and radiological sampling data, description of tasks, and historical RFP data, the Occupational Health Department physicians will use their expertise to determine how the standard RFP medical

examination will be conducted to cover the hazards of concern. EG&G employees assigned to work on an ER site will receive individual examinations based on potential exposures and their personal health status prior to engaging in on-site activities.

The content of the medical examination will be determined by the Occupational Health Director or in certain situations by a private attending physician and may include the following elements

- o Completion by the employee of the "Medical and Occupational History Form" (RF-46498).
- o Annual "At-risk" physical examination
- o Chest x-ray (as required)
- o Pulmonary function test (FEV/FVC)
- o Electrocardiogram (EKG)
- o Complete blood count with differential
- o SMAC 23
- o Urinalysis (dipstick and microscopic)
- o Visual acuity
- o Silt lamp examination
- o Audiogram
- o A radiological bioassay

Additionally, the examining physician will provide a written opinion of the employee's ability and fitness to perform the required job task(s) and wear a respirator. The physician will take into consideration:

- o temperature extremes that may be encountered as a result of environmental conditions and/or wearing protective clothing,
- o physical exertion, and
- o respirator usage

The examining physician's opinion will be provided on Hazardous Waste Operations Form RF-47322 (See Figure 5-1).

The content of the follow-up examination and employee termination examination will include at least those items included in the baseline examination and give consideration to any additional health hazards encountered at the site since the employee's most recent examination. This will allow the physician to make comparisons to previous data, possibly detect early signs of adverse health effects and facilitate protective measures. The attending physician may add to the testing and/or examination as he sees fit.

5.2.1 Frequency of Medical Examinations

EG&G employees assigned to work in or around a designated ER remedial action site will undergo a baseline medical examination prior to initiating on-site activities. Employees will have a follow-up medical examination at least once each year and at termination of employment or reassignment if the employee has not had an examination within the last six months. The Occupational Health Director may elect to have examinations, consultations, and/or medical surveillance tests conducted on a more frequent basis. EG&G employees will be given another physical examination by the Occupational Health Department if:

- o they are suspected of having an overexposure to chemicals used on site,
- o they develop a lost-time illness of 5 working days or more,
- o they sustain a lost-time injury, or
- o they receive a Committed Effective Dose Equivalent (CEDE) greater than 5 rem

The re-examination requirements shall be specified by the Occupational Health Director. The Occupational Health Department shall document that the employee is fit to return to work or specify any activity restrictions as outlined in EG&G Health & Safety Practices Manual,

Procedure 4 03. Subcontractors are expected to follow a similar protocol in their medical surveillance program

5.2.2 Availability of Service

The Occupational Health Department is located in Building 122 and can be reached by phone at extension 2594. The full staff is on duty from 7:30 a.m. to 4:00 p.m., Monday through Friday. The registered nursing (R.N.) staff is available from 6:30 a.m. to 10:00 p.m., Monday through Friday. A physician and a nurse are always on call, for any emergency, during off hours. Weekend coverage (Friday 10:00 p.m. through Monday 6:30 a.m.) is provided by emergency medical technicians (EMTs). They can be contacted at Extension 4336 and will meet employees in the Occupational Health Department or respond to the site of any emergency. Medical assistance will be provided to subcontractors by EG&G in the event of an emergency. Emergency response procedures and pertinent phone numbers are identified in chapter 7 of this document and in each Site-Specific Health & Safety Plan.

5.2.3 Transportation for Medical Reasons

EG&G will provide transportation for employees (if it is safe to do so as determined by the Medical Staff) either to their home or to an appropriate medical facility for:

- o emergency: EMT's, with the assistance of an Occupational Health physician, will determine the appropriate mode of transportation for illness/injury requiring air or ground ambulance transport, or
- o non-emergency: if ambulance transport is not required, supervisors will be asked to arrange transportation.

In an incident where an employee is injured and requires non-ambulance transport to an off-site medical facility, once authorized to do so by the medical staff, the supervisor or designee shall accompany that person, as a representative of the company, and will be available to

interface with outside authorities (if necessary) and to provide further transportation for the employee as appropriate. Supervisors unable to arrange transportation on weekends or during night work, should contact the RFP Shift Superintendent (Emergency Coordinator) for assistance. Ambulance service will be provided to subcontractors by EG&G in the event of an emergency.

5.2.4 Medical Restrictions

The Occupational Health Department has the responsibility of assisting management in ensuring the placement of employees in work situations that will not create undue hazard(s) to the individual(s), co-workers, the public, and the general environment. The Occupational Health Department is also responsible for applying preventive medical measures toward the maintenance of good physical and mental health of employees.

5.2.5 Supervisor's Responsibility

The supervisor has several responsibilities pertaining to medical surveillance, which include

- o confirming, through the Occupational Health Department, that employees are fit and do not have restrictions that will interfere with their job performance,
- o recognizing signs or symptoms of exposure to site contaminants or environmental factors such as heat stress and cold stress (Information pertaining to recognition of such signs or symptoms may be acquired through the OSHA Health and Safety Supervisor training, Hazard Communication training, and Material Safety Data Sheets),
- o sending employees to the Occupational Health Department for a work restriction re-evaluation if there has been a change in the employee's physical or mental condition, and

- o consulting personnel files regarding employee restrictions prior to placing the employee in a new position.

5.2.6 Employee's Responsibility

Medical surveillance is also the responsibility of each employee. Employees have responsibilities similar to the supervisors in this area; these responsibilities include:

- o advising their supervisors of any physical or mental conditions which could affect work performance,
- o recognizing the easily detectable signs or symptoms of exposure to site contaminants and environmental factors such as heat stress and cold stress (Information pertaining to recognition of such signs or symptoms is acquired through the OSHA 40 hour Health and Safety training course, and site specific training, Hazard Communication training, and Material Safety Data Sheets),
- o reporting all occupational injuries or illnesses immediately,
- o reporting to Occupational Health to have limitations verified or restrictions imposed (Restrictions recommended by an off-site physician must be presented in writing to the Occupational Health Department.), and
- o reporting to the Occupational Health Department for re-evaluation as scheduled

5.2.7 Work Assignments

A worker may be temporarily or permanently reassigned based on their mental or physical condition. The Occupational Health Department will perform an assessment, communicate the need for a medical restriction to appropriate persons, and provide follow-up evaluations on the restriction status.

5.2 8 Medical Records

All medical information will be included in the individual's file including laboratory reports, EKG reports, X-ray reports, health histories, physical examinations, and letters/reports from employee's personal or referral physician

Medical and exposure monitoring records shall be maintained by the Occupational Health Department in accordance with the requirements of 29 CFR 1910.20 "Access to Employee Exposure and Medical Records" and EG&G Health & Safety Practices Manual, Procedure 4.05

Medical surveillance records at ER remedial project work sites shall be retained on site in a "Confidential Employee Training and Medical Certification File" These records include.

- o Medical Surveillance Information Sheet (Figure 5-2)
- o The "Physician's Written Opinion"

Subcontractors will maintain medical Fit-for-Duty documentation on site for their personnel

OCCUPATIONAL HEALTH DEPARTMENT
ROCKY FLATS PLANT

FIGURE 5-1

MEDICAL SURVEILLANCE PROGRAM
HAZARDOUS WASTE OPERATIONS

PHYSICIAN'S CHECKLIST AND WRITTEN OPINION

EMPLOYEE NAME		WORK AREA	
SSN		JOB	

PART A - PHYSICIAN'S CHECKLIST			
	I have examined this employee and have been provided with the following	YES	NO
1	A medical and work history with specific emphasis related to the handling of this substance and health hazards and to the fitness for duty including the ability to wear any required Personal Protective Equipment under conditions (i.e. temperature extremes) that may be expected at the work site		
2	A copy of the OSHA <u>Hazardous Waste Operations and Emergency Response, CFR 1910.120</u>		
3	A description of the employee's duties as they relate to the employee's exposure		
4	The employee's representative or anticipated exposure level		
5	A description of any personal protective and respiratory equipment used or to be used.		
6	Information from previous medical examinations that is not otherwise available to me i.e. medical records obtained from employment having a positive history of exposure. This employee's written consent was required to obtain these medical records		

PART B - PHYSICIAN'S WRITTEN OPINION (PWO)		YES	NO
1	Are there any detected medical conditions that would place this employee at an increased risk of material health impairment from work in hazardous waste operations or emergency response or from respirator use?		
If YES please list the conditions, e.g. shortness of breath _____ _____ c. _____ d. _____ e. _____			
2	Are there recommended limitations on the employee or on the use of personal protective equipment such as respirators?	YES	NO
If YES please list the limitations and if temporary or permanent <div style="display: flex; justify-content: space-between;"> LIMITATION/RESTRICTION TEMPORARY PERMANENT </div>			
a.	_____		
b.	_____		
c.	_____		
d.	_____		

	The employee has been informed by me of the results of this medical examination and any medical conditions that may require further examination and treatment.	YES	NO
3			

	This employee has been provided with a copy of his PWO? If YES the date employee was provided with PWO _____	YES	NO
4			

EMPLOYEE SIGNATURE	DATE
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SUPERVISOR	SIGNATURE	DATE
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FIGURE 5-2
MEDICAL SURVEILLANCE INFORMATION SHEET

Employee Name _____ SSN _____

Title _____

Operable Unit _____ Phase _____

Describe the employee's duties as they relate to the exposures at the ER remedial project site.

Detail the estimated exposure levels anticipated for this employee at this ER remedial project site

Describe the Personal Protective Equipment (PPE) that this employee is anticipated using at this ER remedial project site:

CHAPTER 6

HAZARD EVALUATION

6.0 OVERVIEW

A hazard assessment must be completed for each task performed at environmental restoration sites prior to the initiation of field work. The assessment is to identify chemical, radiological, biological, and physical hazards in a manner that specifies items such as:

- o the chemical, physical, and radiological hazards of the contaminants present,
- o the media in which the contaminants exist (ie. air, water, soils),
- o routes of potential exposure (ie. inhalation, ingestion, skin permeability),
- o the acute and chronic health effects resulting from exposure,
- o potential fire, explosion, and reactivity hazards,
- o weather conditions that could lead to heat stress or hypothermia,
- o general safety hazards (ie. slippery or unstable surfaces, steep or uneven grades, electrical hazards, material handling hazards, etc.);
- o noise hazards, etc.

Toxicological references, such as those listed in Appendix III, are to be utilized to further evaluate the associated risks of known contaminants. Based on these assessments, engineering controls, work practices, and personal protective equipment requirements shall be developed to maintain hazardous chemical and radiological exposures As Low As Reasonably Achievable (ALARA) and below OSHA Permissible Exposure Limits (PELs) or published exposure limits during field operations.

The hazards associated with work on an environmental restoration site can be assessed by reviewing existing data and conducting on-site assessments during field operations. Existing chemical and radiological data sources include EG&G documents, environmental monitoring data, historical process data, and waste stream characterizations.

This Section describes sources of information available at the RFP and off site, and the types of data available from these sources. It further describes the roles that key departments play in providing site hazard information needed to characterize the risks at Operable Units

6.1 Sources of Existing Information

The Occupational Safety Department will write a health and safety plan for each of the 16 ER Operable Units listed in Table 5 of the IAG (see Appendix II). This document will identify the hazards anticipated within each unit by extracting data from the existing sources. These Operable Unit Site Plans will be available to subcontractors in order for them to develop their task-specific Site Safety & Health Plans.

The Industrial Hygiene Department maintains monitoring data related to employee exposures to chemicals. Summaries of available IH monitoring data will be included in the

hazard assessment section of the Site Plan Industrial Hygiene shall develop the chemical monitoring requirements for the Operable Unit Health and Safety Plans

The Environmental Monitoring and Assessment Department manages a database containing the analytical results of ground water, surface water, soil, and air samples. The database includes chemical and radiological information. Data can be retrieved for an area of the Rocky Flats Plant or for a specific ground water monitoring well, soil boring, or sampling location or sorted to generate results from a certain time period The department also maintains published documents that summarize specific sites

The Waste Operations Department coordinates waste disposal activities at the Plant They document waste stream composition to ensure compliance with disposal regulations The data available from these departments were not collected for evaluation of human exposures, but can provide information on the bulk composition of materials present at a site

The Environmental Management Department keeps records of site-wide effluent monitoring. Site Environmental Reports are published monthly and annually by the Department. Contact the Clean Water Act Department (CWAD) for reports which describe chemical and radiological effluent monitoring activities, summarize the monitoring results, and demonstrate compliance with environmental regulations.

Radiological monitoring data from specific buildings or areas of the Plant are available from the Radiological Engineering Department, Records Branch. The Radiological Engineering and Radiological Operations Departments share responsibility for monitoring employees for potential exposures to radiological materials. Radiological Engineering develops monitoring programs which are then implemented by Radiological Operations. Phone numbers for the divisions identified in this section are included in Appendix IV

6.2 Chemical Hazards

Potential chemical contaminants at ER sites identified in the IAG include organic solvents, hydrocarbon fuels, heavy metals, corrosives, peroxides, toxic gases, mixed wastes and flammables. An oil sludge pit, chemical burial area, liquid dumping area, drum storage area, reactive metal destruction area, gas detoxification area, hazardous waste storage area, waste spill areas, a waste peroxide drum burial site, and a solvent burning ground are examples of ER sites where these types of compounds may be found. Environmental assessment information continues to develop as progress towards cleaning up the site is made.

Organic solvents that have been identified include: trichloroethane, benzene, carbon tetrachloride, perchloroethylene, trichloroethylene, methylene chloride, acetone, dichloroethane, dichloromethane, chloroform, butanone, methyl ethyl ketone, methyl ethyl ketone peroxide, xylene, toluene, bis(2-ethylhexyl)phthalate, and ethylene glycol. Several of these organic solvents are flammable and have varying degrees of toxicity. The most common routes of exposure for volatile organics are inhalation and skin absorption. Many of the organic compounds that have been identified are chlorinated, which typically affect the central nervous system, cardiovascular system, respiratory system, the kidneys, and the liver. Effects of exposure to these solvents can range from light-headedness to death depending on the level of exposure. Direct or prolonged skin exposure can result in dermatitis and fissuring which can increase a worker's susceptibility to infection. The primary constituents of concern in fuel products include benzene, toluene, and xylenes. Of these three aromatic chemicals, benzene has the lowest permissible exposure limit and is a known carcinogen. Personal exposure monitoring for benzene should be conducted when fuel products are potentially present.

Heavy metals have also been identified on many of the sites covered under this plan. The primary routes of exposure for metals are inhalation and ingestion. Heavy metal toxicity

ranges from acute illness to chronic organ effects and to carcinogenicity. Metals identified at ER sites include aluminum, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, lithium, magnesium, manganese, mercury, nickel, potassium, silver, sodium, selenium, strontium, thallium, vanadium, and zinc.

Exposure to caustics and acids most often cause acute rather than long term effects. Obvious symptoms of exposure to corrosives include eye, skin and respiratory tract irritation and burns. Corrosives identified as potentially present at ER sites include sulfuric acid, nitric acid, hydrofluoric acid, hydrochloric acid, sodium hydroxide, and other sulfates, nitrates, and hydroxides. When acids and caustics are mixed, toxic gases such as chlorine and hydrogen chloride can be generated.

Small concentrations of peroxides have been identified in a spill location and in a drum burial site. Peroxides are oxidizers and can be explosive hazards depending on the concentration and ambient conditions. Many are sensitive to heat, impact, friction or contact with other chemical compounds such as acids, acid alcohols mixtures, and metals. They can ignite organic materials such as acetone and cotton).

Toxic gases may be present at many sites as a result of volatilization, off-gassing, container ruptures, and chemical or biological decomposition. Some of the more toxic gases that could be present include chlorine, hydrogen chloride, carbon monoxide, sulfur dioxide, hydrogen cyanide, ammonia, and hydrogen sulfide.

6.3 Radiological Hazards

Radioactive isotopes, used or generated at the Rocky Flats Plant, which may be detected at Environmental Restoration sites include plutonium, uranium, americium, cesium, strontium,

and tritium. ER worksites that have been identified as radiologically contaminated include the Solar Evaporation Ponds, drum storage areas, hazardous waste storage areas, original uranium chip roaster area, radioactive liquid waste storage tanks, waste spill sites, cooling tower ponds, and a former radioactive soil burial site. In addition, some soil, ground water and surface water investigation sites contain radiological components.

The risks associated with overexposure to ionizing radiation vary with the dose, route of exposure, and the type of radiation. Based on historical assessment data, acute, high-level exposure to radioactive materials at Environmental Restoration sites is not likely to occur, whereas, chronic, low-level exposures are a possibility. Uncontrolled, chronic exposures above background may contribute to an increased risk of cancer.

6.4 Monitoring Program

A program to monitor ER site workers shall be implemented during the initial hazard assessment for both chemical and radiological hazards. The objectives of the monitoring program are to ensure adequate protection of workers and compliance with applicable regulations. Real-time monitoring data, along with field observations, can indicate whether a sampling and analysis plan should be modified. The program should include monitoring for contaminants of concern identified during the initial hazard assessment or from historical data. Because personnel exposures have not been documented for the specific ER tasks and comprehensive data may not be available to assess hazards for all the sites, the monitoring program should begin with a broad scope and be adjusted as results are reviewed. Integrated personal sampling for chemical and environmental hazards will be done to obtain 8-hour time-weighted averages and short term exposure data. Industrial Hygiene will determine which constituents to evaluate based on the hazards believed to be present in accordance with accepted professional sampling protocols. In areas where radiological hazards are of concern, workers

will be required to wear radiation dosimeters and be actively monitored for radioactive contamination daily throughout the workday and before leaving the site.

Integrated personal sampling will be combined with real-time monitoring to further characterize potential exposures. Monitoring for organic compounds can be conducted using a variety of portable instruments, such as a flame ionization detector (FID, e.g., the Foxboro Organic Vapor Analyzer) or a photoionization detector (PID, e.g., the hNu). PID instruments can also detect some inorganic compounds such as ammonia and hydrogen sulfide, however, the instrument sensitivity for these compounds is low. A portable gas chromatograph (GC) can be employed to identify specific organics that may present. GCs can be used for both quantitative and qualitative chemical analyses. Detector tubes are available to monitor inorganic and organic compounds such as hydrogen cyanide, hydrogen sulfide, mercury, acetone, trichloroethylene, and many others. Electronic read-out, compound-specific monitoring instruments are also available to monitor substances such as hydrogen sulfide and carbon monoxide.

A combustible gas meter should be used to monitor for explosive or flammable hazards. Oxygen levels should be monitored with oxygen (O₂) meters. Explosion hazards are typical of investigations involving fuel products or fuel storage units and landfills. Environments with low oxygen content may be encountered during activities in confined spaces.

Instruments such as Geiger-Mueller survey meters, FIDLER monitors, proportional detectors (such as air ionization detectors and scintillometers) are used to measure ionizing radiation. Each respective instrument detects different types of radiation, e.g., alpha, beta, gamma, etc., and can be used to indicate when radiological action levels are approached or contamination is present.

6.5 Heat Stress

Workers assigned to tasks which require the use of personal protective equipment are at risk of developing heat stress when ambient temperatures exceed 70 °F. Impermeable clothing limits the body's normal heat exchange mechanisms and increases energy expenditure. Heat stress can cause health effects which range from heat fatigue to serious illness or death. Signs and symptoms of heat stress include

- o HEAT RASH that results from continuous exposure to heat or humid air;
- o HEAT CRAMPS that are caused by heavy sweating with inadequate electrolyte replacement (Signs and symptoms include muscle spasms and pain in the hands, feet and abdomen),
- o HEAT EXHAUSTION that occurs from increased stress on various body organs including inadequate blood circulation due to cardiovascular inefficiency or dehydration. (Signs and symptoms include pale, cool, moist skin, heavy sweating, dizziness; nausea, and fainting.) and
- o HEAT STROKE, which is the most serious form of heat stress, occurs when the body's mechanism for temperature regulation fails and rises to critical levels (Immediate action must be taken to cool the body before serious injury and death occur. Medical help must be obtained. Signs and symptoms are: red, hot, usually dry skin, lack of or reduced perspiration; nausea; dizziness; confusion; strong, rapid pulse; or coma.).

6.6 Cold Exposure

When working outdoors in temperatures below freezing, workers can become frostbitten.

Exposure to extreme cold can cause severe injury to the body surface or can result in profound generalized cooling, causing death. In cold weather, precautions should be taken to prevent cold exposure by wearing properly insulated garments and taking warm-up breaks when necessary

Symptoms of cold exposure are:

- o FROST NIP OR INCIPIENT FROSTBITE, which is characterized by sudden blanching or whitening of the skin,
- o SUPERFICIAL FROSTBITE, which causes the skin to become waxy or white and superficially firm, but resilient beneath,
- o DEEP FROSTBITE, which is characterized by cold, pale, solid skin tissues, and
- o SYSTEMIC HYPOTHERMIA, which is caused by exposure to freezing or rapidly dropping temperature. Symptoms are usually exhibited in the following stages shivering, apathy; listlessness, sleepiness and rapid cooling of the core body temperature to less than 95 °F; unconsciousness, glassy stare, slow pulse and slow respiratory rate; freezing of the extremities; and death.

Monitoring guidelines for heat and cold stress are included in Appendix D of the Health and Safety Plan Workbook.

6.7 Noise Exposure

Workers can be exposed to noise while working on Environmental Restoration sites when using heavy equipment such as mixers, pumps, air compressors, electrical generators, drill rigs, heavy construction equipment, and jack hammers. Where noise levels equal or exceed an 85 dBA 8-hr time weighted average (TWA), the requirements of EG&G's Health & Safety Practices Manual, Procedure 7 06 shall be complied with. In accordance with the Threshold Limit Values (TLV's) established by the American Conference of Governmental Hygienists (ACGIH), noise exposure shall be controlled to levels below those stipulated in Table 6-1, or adequate hearing protection shall be required for all exposed personnel. Industrial Hygiene shall be responsible for noise monitoring of EG&G employees.

6.8 Mechanical Hazards

There are numerous mechanical hazards associated with the tasks which are scheduled at identified Environmental Restoration sites. Potential mechanical hazards at ER sites include hazards associated with the operation of heavy equipment such as air compressors, backhoes, drill rigs, trenchers, electrical motors and pumps. Heavy equipment must be maintained in good working order. Motors, chases, blades, bladeholders, tracks, drives, hydraulic and pneumatic mechanisms, and transmissions should be inspected each day. Minimum requirements for operating and maintaining heavy equipment include:

- o ensuring that machinery is not used on inclines where it could roll over,
- o not leaving running equipment unattended,

- o requiring seat belts for equipment that has roll over protective structures,
- o providing at least one 2 lb B/C fire extinguisher in a vehicle located within 100 feet of construction operations, and
- o maintaining an appropriate amount of fuel in equipment for emergency use

Underground and overhead utilities could be potential hazards on some locations. Information concerning the safe use of cranes and derricks is in Section 12.00 of the EG&G Health & Safety Practices Manual.

Operational Safety Analyses (OSA), Job Safety Analyses (JSAs), Standard Operating Procedures (SOPs) and/or Waste Operation (WO) procedures will be written prior to performing tasks at ER sites to identify potential hazards and to document a safe procedure for performing the task (see Section 3.3 for a list of existing SOPs and section 2.11 of the EG&G HS&P Manual for information and instructions on preparing a JSA). A health and safety manual is planned for Rocky Flats construction activities. Contact the construction safety department for related information.

6.9 Confined Space Entry

Confined space entry may be required on environmental restoration sites. RFP procedures for working in a confined space can be found in the Health and Safety Practices Manual, Chapter 6.04, and shall be followed when a confined space entry is to be made. The procedure addresses responsibilities, training requirements, ventilation, atmospheric testing, protective equipment, confined space entry permits, and posting.

TABLE 6-1

THRESHOLD LIMIT VALUES FOR NOISE

Duration per Day Hours	Sound Level DBA*
16	80
8	85
4	90
2	95
1	100
1/2	105
1/4	110
1/8	115**

*Sound level in decibels are measured on a sound meter, conforming as a minimum to the requirements of the American National Standards Specification for Sound Level Meters, S1.4 (1971 Type S2A, and set to use the A-weighted network with slow meter response).

**No exposure to continuous or intermittent in excess of 115 DBA

CHAPTER 7

EMERGENCY RESPONSE

7.0 Introduction

A site specific emergency response plan that explains how emergencies will be handled must be developed for each ER Operable Unit. The OSHA requirements for site emergency response plans are identified in 29 CFR 1910.120(l) [see Appendix I]. Environmental Restoration emergency response plans should incorporate applicable elements from the Rocky Flats Emergency Plan and the RCRA Contingency Plan to provide a comprehensive site response plan.

7.1 Purpose

Emergency procedures are intended to minimize the impact of an emergency situation on the health and safety of personnel and on property at remedial project work sites. These procedures, which are to be an integral part of the Site-Specific Health & Safety Plan, shall identify the manpower and equipment available for industrial, radiological, and natural emergencies as well as the specific actions to be followed when responding to accidents and injuries.

The periodic rehearsals of site specific emergency response procedures shall be conducted and documented as part of the overall training program for site operations. The frequency of rehearsals is addressed in Chapter 4 of this document. The responders and key people affected by these procedures shall provide written comments and a critique of the effectiveness of the response procedures after each training exercise. This information shall be used by the ER Project Manager and Site Health & Safety Coordinator to evaluate and modify the emergency response program.

7.2 Key Personnel

The names and phone numbers of key personnel at ER remedial project sites with the authority and training to respond to accidents and emergencies must be provided in the Site Plan and posted on site so that they are readily accessible to site workers. Key ER site personnel to be contacted in the event of an emergency are as follows:

1. Environmental Restoration Project Manager
2. Site Health & Safety Coordinator
3. Subcontractor Field Engineer
4. Subcontractor Health & Safety Officer

Other important Rocky Flats emergency contacts are:

- | | | |
|---|-----------------|-----------|
| o | EMT/AMBULANCE | ext. 2911 |
| o | FIRE | ext. 2911 |
| o | POLICE/SECURITY | ext. 2911 |

The Emergency Coordinator (EC) for the Rocky Flats Plant (RFP) is the Shift Supervisor on duty. The EC will respond to all emergencies and is responsible for the implementation and coordination of the RFP Contingency Plan. The EC is also responsible for determining the extent of the emergency, assessing hazards to human health and the environment, and coordinating emergency response activities. The EC will activate the Emergency Operation Center (EOC), notify departments that have an advisory role in the situation and determine if additional help from off-site agencies (police, medical, etc.) is required.

The EC will also notify any of the following groups when needed:

- | | |
|----------------------------|----------------------|
| o Radiological Engineering | o Industrial Hygiene |
| o Industrial Safety | o Waste Operations |

- o Waste Programs
- o Traffic
- o Event Notification Officer
- o H&S Area Engineering

Radiological Engineering and Industrial Hygiene will assess any hazards associated with the release of spilled material. The RFP Hazmat Team will respond to contain and mitigate hazardous material spills or releases. Waste Programs will evaluate the incident for regulatory agency reporting requirements such as those required by RCRA, SARA Title III, and the IAG. In the event of a spill, notification must also be made to Response and Reporting at x7264.

7.3 Medical Emergency Response Procedures

Emergency medical assistance is available on plant site 7 days a week, 24 hours per day by calling 2911. Due to the close proximity and rapid response time of the emergency response team, fully trained medical assistance will be readily available on all ER sites. In the event of a site emergency only EMT notification and initial patient stabilization should be the role played by site personnel. At a minimum, the Subcontractor H&S coordinator is required to be a current card holder for the Red Cross First-Aid and Adult CPR courses. The texts provided for the Red Cross courses shall be kept in the site manager's office for use as Standard Operating Procedures for medical emergencies. The following list provides examples of medical emergencies that should be planned for:

- o fractures, dislocations, sprains, and strains
- o severe bleeding, cuts, scrapes, and bites
- o temperature extreme disorders
- o heart attacks and strokes
- o seizures
- o diabetic emergencies
- o poisoning

- o burns, including fire and chemical
- o shock
- o skin or eye injuries that would require immediate flushing or showering
- o symptoms of overexposure to hazardous substances

7.3.1 Emergency Decontamination

When an injured person is contaminated, a decision will be required to give priority to first aid or decontamination. As outlined in Chapter 4.02 of the Rocky Flats HSP Manual, the EMT Officer responding to the incident will make the decision as to the type of transportation and to where the patient is to be transported. The on-call physician will be contacted on all emergencies expected to require off-site treatment. If the injury requires transport without decontamination and the on-call physician has not been reached, the Shift Superintendent is responsible for authorizing the patient transport. Radiation Protection, Radiation Engineering, and Industrial Hygiene will assist in monitoring contamination levels and directing the procedures to follow for contamination control. If the condition of the patient is life-threatening, e.g. a heart attack, first aid actions will take priority over decontamination unless the contamination would harm response personnel. Figure 7-1, Decision Aid for Emergency Decontamination, should be used to assist in making this decision.

7.4 Fire Response Procedures

The actions to be taken when a fire occurs at ER remedial project work sites shall be identified in the Site Plan to provide the workers with guidance. In all cases, the Fire Department shall be notified at ext. 2911.

- o Small, localized fires shall be handled using the appropriate fire extinguisher to bring the occurrence under control. Fire extinguishers are to be used by trained personnel only.

- o Uncontrolled fires shall be handled by the Fire Department. Workers shall call ext. 2911, then evacuate the area. (Workers shall call from the ER site only when it is safe to do so. If the situation is life-threatening, evacuate to a safe location and then notify the Fire Department.)
- o If there is a potential for the release of toxic gases, all persons in the immediate vicinity shall be evacuated and the fire department shall be notified.

7.5 Spill Response Procedures

In the event of a spill of a liquid hazardous substance that is greater than one pint or one pound, a solid hazardous substance spill greater than one pound or any gaseous release, notify the site supervisor and the Shift Superintendent immediately. The Shift Superintendent will make the appropriate notifications to implement the appropriate responses (see section 7.2). Life threatening hazardous material spills or releases are reported by calling 2911.

Non-emergency spills are reported by calling 2914. If it can be safely accomplished, site personnel can take immediate action to mitigate a spill when it is discovered. Personnel shall only take mitigating action when they are certain of the hazards that exist and are trained to react appropriately. The Shift Superintendent must be immediately informed of the spill. If a hazardous substance spill poses no greater risk than those experienced during normal duties, the employee may be instructed to clean up the spill. Occupational Safety, Industrial Hygiene, Radiological Engineering, Radiological Operations or other applicable departments shall be available for additional instruction on how to handle minor spills.

Tasks that could result in a spill must be identified in the site specific health and safety plan. In addition, a list of materials that will be maintained on the ER remedial project site for spill response and the detailed response actions to be taken must be included.

7.6 Notification and Reporting

The employee discovering an emergency is responsible for immediately reporting the situation, by the most expeditious means available, to the person in charge at the ER remedial project site. On-site communication must be listed in the Site Plan. If phones are not available on site, radio contact must be maintained with someone who could report an accident immediately. One or more of the following items must be available on each ER site: telephone, portable radio, or alarm devices.

The Environmental Restoration Department's representatives involved in emergency response include the Project Manager and the Site Health and Safety Officer. Subcontractor representatives responsible for responding to emergencies at their sites include the Health and Safety Officer and the Field Supervisor.

When reporting an emergency provide as much detail as possible, such as.

- o your name
- o your location
- o exact location of the emergency
- o nature of the emergency
- o condition of patient if applicable (breathing, consciousness, bleeding, etc.)
- o special hazards in the area
- o any other information requested

7.7 Evacuation Plan

The Rocky Flats Plant has an established evacuation plan to be used by all employees and contractors that consists of a set of procedures directing employees to a safe assembly area during an emergency to ensure their safety or to enhance the emergency response. Major

emergencies that could threaten human health or the environment may require that an area, a building, or the entire plant be evacuated

Emergency procedures for specific response actions not identified in the RFP Emergency Plan are to be prepared as part of the Site-Specific Health & Safety Plan. These procedures are to include the names and numbers of personnel to notify, evacuation routes, assembly areas, and safety issues

When evacuation of any part of the facility is called for by the EC, all employees, contractors and visitors in that area will immediately leave the work area and proceed to the designated assembly area. Rocky Flats personnel will be accounted for by their supervisors. A list of visiting personnel will be available from the site and building sign-in records. Generally, if personnel are downwind of the incident, they will evacuate perpendicular to the wind direction, and if they are upwind of the incident, they will evacuate in the upwind direction.

7.8 Emergency Equipment

Heavy equipment used for day-to-day operations may be required during an emergency. This equipment should be maintained in good condition and with a fuel level greater than one-fourth full. Equipment should be readily repaired when defects are detected so that the equipment is always available for use.

Personal protective equipment must be kept in reserve and maintained for emergency use. This equipment may be from the same stock that is used for daily operations provided the portion of stock reserved for emergency use is not depleted. The next higher level of protection from that used for routine operations must be available. For example, if Level C is the maximum routine level of protection used, then Level B protective equipment must be on hand for emergency use.

Other equipment that should be available on each ER site include

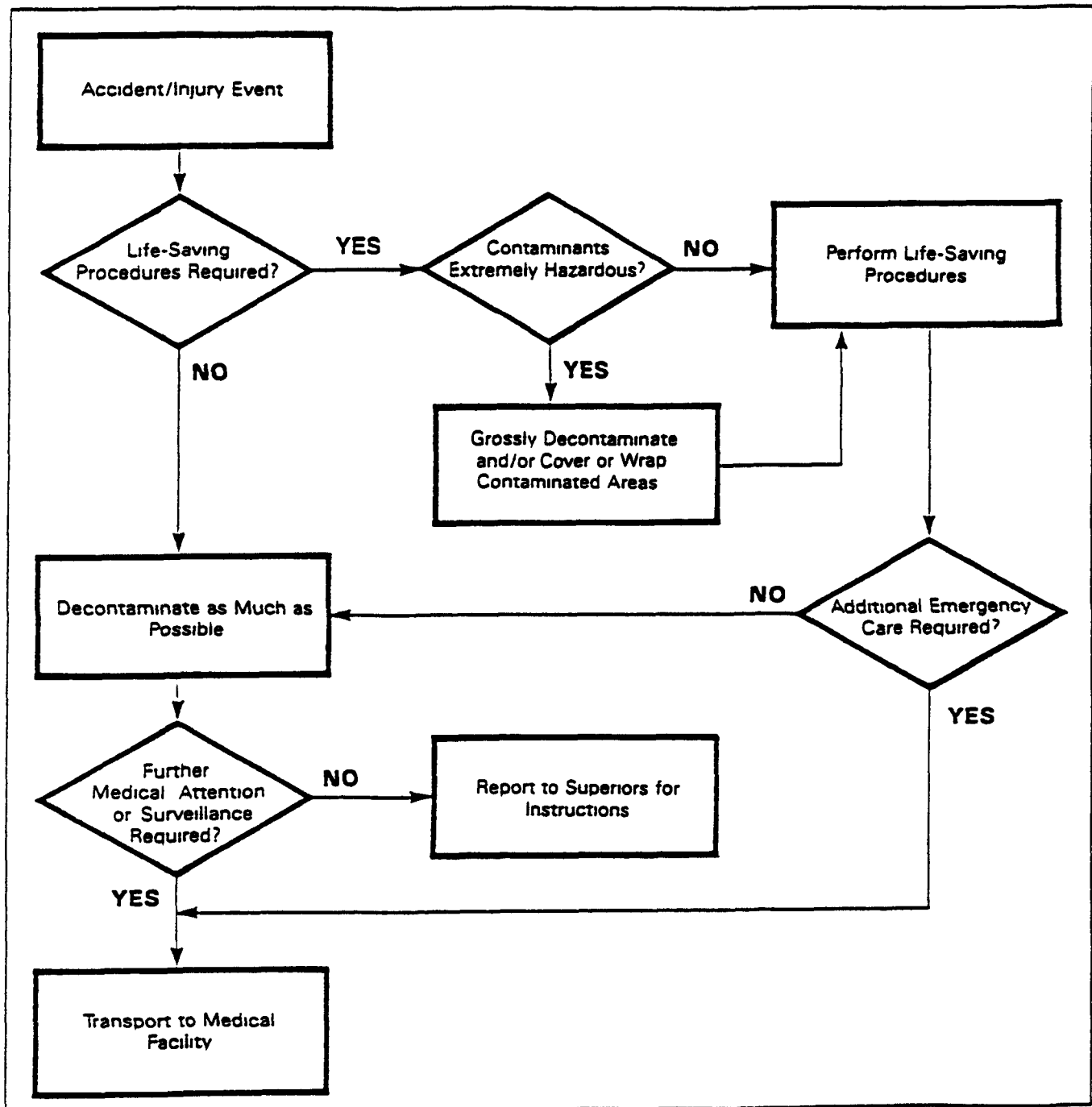
- o first aid kits via EMTs
- o fire extinguisher & blanket
- o 15-minute eye wash and quick drench shower
- o 10 gallons of water, in portable containers
- o decontamination solutions appropriate for site hazards

The emergency response equipment utilized and maintained by the RFP Hazmat Team is identified in the Rocky Flats Fire Department Hazardous Materials Response Team Manual.

7.9 Alarms

All site personnel will be trained to immediately recognize RFP and ER site alarm signals. Standard alarm signals must be documented in each Site Plan. Subcontractors can call 966-7541 to listen to a recording of RFP alarm signals and the significance of each.

Figure 7-1: Decision Aid for Emergency Decontamination



APPENDIX I

HAZARDOUS WASTE OPERATIONS
AND EMERGENCY RESPONSE

29 CFR 1910.120

(2) *Design pressure and classification of containers* (i) The minimum design pressure for containers shall be 250 p.s.i.g.

(ii) The shell or head thickens of any container shall not be less than three-sixteenths inch

(3) *Mounting of containers* All containers and flow-control devices shall be securely mounted

(4) *Container valves and accessories*

(i) Each container shall have a fixed liquid-level gage

(ii) The filling connection shall be fitted with a combination back-pressure check valve and an excess-flow valve; one double or two single back-pressure check valves or a positive shutoff valve in conjunction with an internal back-pressure check valve or an internal excess-flow valve

(iii) The applicator tank may be filled by venting to open air provided the bleeder valve orifice does not exceed seven-sixteenths inch in diameter

(iv) Regulation equipment may be connected directly to the tank coupling or flange in which case a flexible connection shall be used between such regulating equipment and the remainder of the liquid withdrawal system. Regulating equipment not so installed shall be flexibly connected to the container shutoff valve

(v) No excess flow valve is required in the liquid withdrawal line provided the controlling orifice between the contents of the container and the outlet of the shutoff valve does not exceed seven-sixteenths inch in diameter

§1910.112 [Reserved]

§1910.113 [Reserved]

§1910.114 Effective dates

(a) The provisions of this Subpart H shall become effective on August 27, 1971 except as provided in the remaining paragraphs of this section

(b) The following provisions shall become effective on February 15, 1972

§1910.101(b)

§1910.102

§1910.103 (a)(2), (b)(1)(i) (b)(1)(iii), (b)(2)(ii) and (b)(3)

§1910.105

§1910.106 (b)(1) (b)(2), (b)(3), and (b)(4)

§1910.106 (b)(5) (c)(1) (c)(2) (c)(3) (c)(4)

(c)(5) (c)(6) (d)(2), (d)(3)(ii), (d)(4)(i)

(d)(4)(iii) (d)(4)(iv), (d)(5)(v), (d)(5)(vi)(a)

(e)(3)(iii) (e)(3)(v), (e)(4), (e)(7), (f)(2)(iii)

(f)(3)(i), (f)(4)(iii); (f)(4)(iv), (f)(4)(viii), (f)(5), (g), (h) and (i)

§1910.107(b)(1), (b)(2), (b)(3), (b)(4), (b)(5)(i), (b)(5)(iii), (b)(5)(iv), (b)(6) (b)(7), (b)(8), (b)(10) (c)(1), (c)(4), (c)(5), (c)(6), (c)(7), (d), (e)(7), (e)(8), (f)(1), (f)(2), (h), (i), (j), (l)(2), (l)(3), (l)(5), (l)(6), (l)(7), and (m)(1)

§1910.108(b), (c), (e)(1), (g)(2), (g)(3), (g)(4), and (g)(5)

§1910.108(g)(6) and (h)

§1910.110

§1910.111

(c) Notwithstanding anything in paragraph (a), (b), or (d) of this section, any provision in any other section of this subpart which contains in itself a specific effective date or time limitation shall become effective on such date or shall apply in accordance with such limitation.

(d) Notwithstanding anything in paragraph (a), or (b) of this section, if any standard in 41 CFR Part 50-204, other than a national consensus standard incorporated by reference in §50-204 2(a)(1), is or becomes applicable at any time to any employment and place of employment, by virtue of the Walsh-Healey Public Contracts Act, or the Service Contract Act of 1965 or the National Foundation on Arts and Humanities Act of 1965, any corresponding established Federal standard in this Subpart H which is derived from 41 CFR Part 50-204 shall also become effective, and shall be applicable to such employment and place of employment on the same date

§1910.115 Sources of standards.

Sec.	Source
1910.101	41 CFR 50-204.67, 70 and 71
1910.102	41 CFR 50-204.66
1910.103	NFPA No. 508-1968 Standard for Liquefied Hydrogen Systems at Consumer Sites
1910.104	NFPA No. 566-1965 Standard for the Installation of Bulk Oxygen Systems at Consumer Sites
1910.105-106	NFPA No. 30-1969 Flammable and Combustible Liquids Code
1910.107	NFPA No. 33-1969 Standard for Spray Finishing Using Flammable and Combustible Materials
1910.108	NFPA No. 34-1966 Standard for Dip Tanks Containing Flammable or Combustible Liquids
1910.109	NFPA No. 495-1970 Code for Manufacture, Transportation, Storage and Use of Explosives and Blasting Agents

Sec.	Source
1910.110	NFPA 58-69 Standard for the Handling of Liquefied Petroleum Gases
1910.111	ANSI K61.1-1966 Storage and Handling of Anhydrous Ammonia

§1910.116 Standards organizations.

National Fire Protection Association, 470 Atlantic Avenue, Boston, Massachusetts 02210
National Plant Food Institute, 1700 K Street NW., Washington, D.C. 20006
Compressed Gas Association Inc., 500 Fifth Avenue, New York, NY 10036
American Society of Mechanical Engineers Inc., United Engineering Center, 345 East 47th Street, New York, NY 10017
American Petroleum Institute, 1801 K Street NW., Washington, DC 20006
National Board of Boiler and Pressure Vessel Inspectors, 1155 North High Street, Columbus, OH 43201
American National Standards Institute 1430 Broadway Street, New York, NY 10018
American Society for Testing and Materials (ASTM), 1916 Race Street, Philadelphia PA 19103
Underwriters Laboratories Inc., (UL), 207 East Ohio Street, Chicago IL 60611
Fertilizer Institute, 1015 18th Street NW Washington, DC 20036

[Editor's note: The Occupational Safety and Health Administration adopted §1910.120 on March 6, 1989. It went into effect on March 6, 1990. Following is the text for the final rule with revisions which are effective April 12, 1990.]

§1910.120 Hazardous waste operations and emergency response.

(a) *Scope, application, and definitions*—(1) *Scope*. This section covers the following operations, unless the employer can demonstrate that the operation does not involve employee exposure or the reasonable possibility for employee exposure to safety or health hazards.

(i) *Clean-up operations* required by a governmental body, whether Federal, state, local or other involving hazardous substances that are conducted at uncontrolled hazardous waste sites (including, but not limited to, the EPA's National Priority Site List (NPL), state priority site lists, sites recommended for

[Sec. 1910.120(a)(1)(i)]

the EPA NPL and initial investigations of government identified sites which are conducted before the presence or absence of hazardous substances has been ascertained).

(ii) Corrective actions involving clean-up operations at sites covered by the Resource Conservation and Recovery Act of 1976 (RCRA) as amended (42 U.S.C 6901 et seq.).

(iii) Voluntary clean-up operations at sites recognized by Federal, state, local or other governmental bodies as uncontrolled hazardous waste sites.

(iv) Operations involving hazardous wastes that are conducted at treatment, storage, and disposal (TSD) facilities regulated by 40 CFR Parts 264 and 265 pursuant to RCRA, or by agencies under agreement with U.S.E.P.A. to implement RCRA regulations, and

(v) Emergency response operations for releases of, or substantial threats of releases of hazardous substances without regard to the location of the hazard.

(2) *Application.* (i) All requirements of Part 1910 and Part 1926 of Title 29 of the Code of Federal Regulations apply pursuant to their terms to hazardous waste and emergency response operations whether covered by this section or not. If there is a conflict or overlap, the provision more protective of employee safety and health shall apply without regard to 29 CFR 1910.5(c)(1).

(ii) Hazardous substance clean-up operations within the scope of paragraphs (a)(1)(i) through (a)(1)(iii) of this section must comply with all paragraphs of this section except paragraphs (p) and (q).

(iii) Operations within the scope of paragraph (a)(1)(iv) of this section must comply only with the requirements of paragraph (p) of this section.

Notes and Exceptions. (A) All provisions of paragraph (p) of this section cover any treatment, storage or disposal (TSD) operation regulated by 40 CFR parts 264 and 265 or by state law authorized under RCRA, and required to have a permit or interim status from EPA pursuant to 40 CFR 270.1 or from a state agency pursuant to RCRA.

(B) Employers who are not required to have a permit or interim status because they are conditionally exempt small quantity generators under 40 CFR 261.5 or are generators who qualify under 40 CFR 262.34 for exemptions from regulation under 40 CFR parts 264, 265 and 270 ("excepted employers") are not covered by paragraphs (p)(1) through (p)(7) of this section. Excepted employers who are required by the EPA or state agency to have their employees engage in emergency response or who direct their employees to engage in emergency response are covered by

paragraph (p)(8) of this section, and cannot be exempted by (p)(8)(i) of this section. Excepted employers who are not required to have employees engage in emergency response, who direct their employees to evacuate in the case of such emergencies and who meet the requirements of paragraph (p)(8)(i) of this section are exempt from the balance of paragraph (p)(8) of this section.

(C) If an area is used primarily for treatment, storage or disposal, any emergency response operations in that area shall comply with paragraph (p)(8) of this section. In other areas not used primarily for treatment, storage, or disposal, any emergency response operations shall comply with paragraph (q) of this section. Compliance with the requirements of paragraph (q) of this section shall be deemed to be in compliance with the requirements of paragraph (p)(8) of this section.

[1910.120(a)(2)(iii) corrected, effective April 13, 1990, by 55 FR 14073 April 13, 1990]

(iv) Emergency response operations for releases of, or substantial threats of releases of, hazardous substances which are not covered by paragraphs (a)(1)(i) through (a)(1)(iv) of this section must only comply with the requirements of paragraph (q) of this section.

(3) *Definitions—"Buddy system"* means a system of organizing employees into work groups in such a manner that each employee of the work group is designated to be observed by at least one other employee in the work group. The purpose of the buddy system is to provide rapid assistance to employees in the event of an emergency.

"Clean-up operation" means an operation where hazardous substances are removed, contained, incinerated, neutralized, stabilized, cleared-up, or in any other manner processed or handled with the ultimate goal of making the site safer for people or the environment.

"Decontamination" means the removal of hazardous substances from employees and their equipment to the extent necessary to preclude the occurrence of foreseeable adverse health effects.

"Emergency response" or "responding to emergencies" means a response effort by employees from outside the immediate release area or by other designated responders (i.e., mutual-aid groups, local fire departments, etc.) to an occurrence which results, or is likely to result, in an uncontrolled release of a hazardous substance. Responses to incidental releases of hazardous substances where the substance can be absorbed, neutralized, or otherwise controlled at the time of release by employees in the immediate release area, or by maintenance personnel are not considered to be emergency responses

within the scope of this standard. Responses to releases of hazardous substances where there is no potential safety or health hazard (i.e., fire explosion, or chemical exposure) are not considered to be emergency responses.

"Facility" means (A) any building, structure, installation, equipment, pipe or pipeline (including any pipe into a sewer or publicly owned treatment works), well, pit, pond, lagoon, impoundment, ditch, storage container, motor vehicle, rolling stock, or aircraft, or (B) any site or area where a hazardous substance has been deposited, stored, disposed of, or placed, or otherwise come to be located, but does not include any consumer product in consumer use or any water-borne vessel.

(3) *"Hazardous materials response (HAZMAT) team"* means an organized group of employees, designated by the employer who are expected to perform work to handle and control actual or potential leaks or spills of hazardous substances requiring possible close approach to the substance. The team members perform responses to releases or potential releases of hazardous substances for the purpose of control or stabilization of the incident. A HAZMAT team is not a fire brigade nor is a typical fire brigade a HAZMAT team. A HAZMAT team, however, may be a separate component of a fire brigade or fire department.

"Hazardous substance" means any substance designated or listed under paragraphs (A) through (D) of this definition, exposure to which results or may result in adverse effects on the health or safety of employees.

(A) Any substance defined under section 101(14) of CERCLA.

(B) Any biological agent and other disease-causing agent which after release into the environment and upon exposure, ingestion, inhalation or assimilation into any person, either directly from the environment or indirectly by ingestion through food chains, will or may reasonably be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions (including malfunctions in reproduction) or physical deformations in such persons or their offspring;

[Definition of "hazardous substance" revised effective April 13, 1990 by 55 FR 14073 April 13, 1990]

(C) Any substance listed by the U.S. Department of Transportation as haz-

[Sec. 1910.120(a)(3)(C)]

ardous materials under 49 CFR 172.101 and appendices, and

(D) Hazardous waste as herein defined.

"Hazardous waste" means—

(A) A waste or combination of wastes as defined in 40 CFR 261.3, or

(B) Those substances defined as hazardous wastes in 49 CFR 171.8

"Hazardous waste operation" means any operation conducted within the scope of this standard.

"Hazardous waste site" or "Site" means any facility or location within the scope of this standard at which hazardous waste operations take place.

"Health hazard" means a chemical, mixture of chemicals or a pathogen for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents which act on the hematopoietic system, and agents which damage the lungs, skin, eyes or mucous membranes. It also includes stress due to temperature extremes. Further definition of the terms used above can be found in Appendix A to 29 CFR 1910.1200.

"IDLH" or "Immediately dangerous to life or health" means an atmospheric concentration of any toxic, corrosive or asphyxiant substance that poses an immediate threat to life or would cause irreversible or delayed adverse health effects or would interfere with an individual's ability to escape from a dangerous atmosphere.

"Oxygen deficiency" means that concentration of oxygen by volume below which atmosphere supplying respiratory protection must be provided. It exists in atmospheres where the percentage of oxygen by volume is less than 19.5 percent oxygen.

"Permissible exposure limit" means the exposure, inhalation or dermal permissible exposure limit specified in 29 CFR Part 1910 Subparts G and Z.

"Published exposure level" means the exposure limits published in "NIOSH Recommendations for Occupational Health Standards" dated 1986 incorporated by reference, or if none is specified, the exposure limits published in

the standards specified by the American Conference of Governmental Industrial Hygienists in their publication "Threshold Limit Values and Biological Exposure Indices for 1987-88" dated 1987 incorporated by reference.

"Post emergency response" means that portion of an emergency response performed after the immediate threat of a release has been stabilized or eliminated and clean-up of the site has begun. If post emergency response is performed by an employer's own employees who were part of the initial emergency response, it is considered to be part of the initial response and not post emergency response. However, if a group of an employer's own employees, separate from the group providing initial response, performs the clean-up operation, then the separate group of employees would be considered to be performing post-emergency response and subject to paragraph (q)(11) of this section.

[Definition of "Post emergency response" revised, effective April 13, 1990, by 55 FR 14073 April 13 1990]

"Qualified person" means a person with specific training, knowledge and experience in the area for which the person has the responsibility and the authority to control.

"Site safety and health supervisor (or official)" means the individual located on a hazardous waste site who is responsible to the employer and has the authority and knowledge necessary to implement the site safety and health plan and verify compliance with applicable safety and health requirements.

"Small quantity generator" means a generator of hazardous wastes who in any calendar month generates no more than 1,000 kilograms (2,205 pounds) of hazardous waste in that month.

"Uncontrolled hazardous waste site" means an area where an accumulation of hazardous waste creates a threat to the health and safety of individuals or the environment or both. Some sites are found on public lands, such as those created by former municipal, county or state landfills where illegal or poorly managed waste disposal has taken place. Other sites are found on private property, often belonging to generators or former generators of hazardous waste. Examples of such sites include, but are not limited to, surface impoundments, landfills, dumps, and tank or drum farms. Normal operations at TSD sites are not covered by this definition.

(b) **Safety and health program.**

Note to (b): Safety and health programs developed and implemented to meet other Federal, state, or local regulations are considered acceptable in meeting this requirement if they cover or are modified to cover the topics required in this paragraph. An additional or separate safety and health program is not required by this paragraph.

(1) **General.** (i) Employers shall develop and implement a written safety and health program for their employees involved in hazardous waste operations. The program shall be designed to identify, evaluate, and control safety and health hazards, and provide for emergency response for hazardous waste operations.

(ii) The written safety and health program shall incorporate the following:

(A) An organizational structure.

(B) A comprehensive workplan.

(C) A site-specific safety and health plan which need not repeat the employer's standard operating procedures required in paragraph (b)(1)(ii)(F) of this section.

(D) The safety and health training program;

(E) The medical surveillance program.

(F) The employer's standard operating procedures for safety and health and

(G) Any necessary interface between general program and site specific activities.

(iii) **Site excavation.** Site excavations created during initial site preparation or during hazardous waste operations shall be shored or sloped as appropriate to prevent accidental collapse in accordance with Subpart P of 29 CFR Part 1926.

(iv) **Contractors and sub-contractors.** An employer who retains contractor or sub-contractor services for work in hazardous waste operations shall inform those contractors, sub-contractors or their representatives of the site emergency response procedures and any potential fire, explosion, health, safety or other hazards of the hazardous waste operation that have been identified by the employer, including those identified in the employer's information program.

(v) **Program availability.** The written safety and health program shall be made available to any contractor or subcontractor or their representative who will be involved with the hazardous waste operation, to employees to employee designated representatives to OSHA personnel and to personnel of

[Sec. 1910.120(b)(1)(v)]

other Federal, state, or local agencies with regulatory authority over the site

(2) *Organizational structure part of the site program.*—(i) The organizational structure part of the program shall establish the specific chain of command and specify the overall responsibilities of supervisors and employees. It shall include, at a minimum, the following elements:

(A) A general supervisor who has the responsibility and authority to direct all hazardous waste operations.

(B) A site safety and health supervisor who has the responsibility and authority to develop and implement the site safety and health plan and verify compliance.

(C) All other personnel needed for hazardous waste site operations and emergency response and their general functions and responsibilities.

(D) The lines of authority, responsibility, and communication.

(ii) The organizational structure shall be reviewed and updated as necessary to reflect the current status of waste site operations.

(3) *Comprehensive workplan part of the site program.* The comprehensive workplan part of the program shall address the tasks and objectives of the site operations and the logistics and resources required to reach those tasks and objectives.

(i) The comprehensive workplan shall address anticipated clean-up activities as well as normal operating procedures which need not repeat the employer's procedures available elsewhere.

(ii) The comprehensive workplan shall define work tasks and objectives and identify the methods for accomplishing those tasks and objectives.

(iii) The comprehensive workplan shall establish personnel requirements for implementing the plan.

(iv) The comprehensive workplan shall provide for the implementation of the training required in paragraph (e) of this section.

(v) The comprehensive workplan shall provide for the implementation of the required informational programs required in paragraph (i) of this section.

(vi) The comprehensive workplan shall provide for the implementation of the medical surveillance program described in paragraph (f) of this section.

(4) *Site-specific safety and health plan part of the program.*—(i) *General.* The site safety and health plan, which must

be kept on site, shall address the safety and health hazards of each phase of site operation and include the requirements and procedures for employee protection.

(ii) *Elements.* The site safety and health plan, as a minimum, shall address the following:

(A) A safety and health risk or hazard analysis for each site task and operation found in the workplan.

(B) Employee training assignments to assure compliance with paragraph (e) of this section.

(C) Personal protective equipment to be used by employees for each of the site tasks and operations being conducted as required by the personal protective equipment program in paragraph (g)(5) of this section.

(D) Medical surveillance requirements in accordance with the program in paragraph (f) of this section.

(E) Frequency and types of air monitoring, personnel monitoring, and environmental sampling techniques and instrumentation to be used, including methods of maintenance and calibration of monitoring and sampling equipment to be used.

(F) Site control measures in accordance with the site control program required in paragraph (d) of this section.

(G) Decontamination procedures in accordance with paragraph (k) of this section.

(H) An emergency response plan meeting the requirements of paragraph (l) of this section for safe and effective responses to emergencies, including the necessary PPE and other equipment.

(I) Confined space entry procedures.

(J) A spill containment program meeting the requirements of paragraph (j) of this section.

(iii) *Pre-entry briefing.* The site specific safety and health plan shall provide for pre-entry briefings to be held prior to initiating any site activity, and at such other times as necessary to ensure that employees are apprised of the site safety and health plan and that this plan is being followed. The information and data obtained from site characterization and analysis work required in paragraph (c) of this section shall be used to prepare and update the site safety and health plan.

(iv) *Effectiveness of site safety and health plan.* Inspections shall be conducted by the site safety and health supervisor or in the absence of that

individual, another individual who is knowledgeable in occupational safety and health, acting on behalf of the employer as necessary to determine the effectiveness of the site safety and health plan. Any deficiencies in the effectiveness of the site safety and health plan shall be corrected by the employer.

(c) *Site characterization and analysis.*—(1) *General.* Hazardous waste sites shall be evaluated in accordance with this paragraph to identify specific site hazards and to determine the appropriate safety and health control procedures needed to protect employees from the identified hazards.

(2) *Preliminary evaluation.* A preliminary evaluation of a site's characteristics shall be performed prior to site entry by a qualified person in order to aid in the selection of appropriate employee protection methods prior to site entry. Immediately after initial site entry, a more detailed evaluation of the site's specific characteristics shall be performed by a qualified person in order to further identify existing site hazards and to further aid in the selection of the appropriate engineering controls and personal protective equipment for the tasks to be performed.

(3) *Hazard identification.* All suspected conditions that may pose inhalation or skin absorption hazards that are immediately dangerous to life or health (IDLH), or other conditions that may cause death or serious harm, shall be identified during the preliminary survey and evaluated during the detailed survey. Examples of such hazards include, but are not limited to, confined space entry, potentially explosive or flammable situations, visible vapor clouds, or areas where biological indicators such as dead animals or vegetation are located.

(4) *Required information.* The following information to the extent available shall be obtained by the employer prior to allowing employees to enter a site:

(i) Location and approximate size of the site.

(ii) Description of the response activity and/or the job task to be performed.

(iii) Duration of the planned employee activity.

(iv) Site topography and accessibility by air and roads.

(v) Safety and health hazards expected at the site.

(vi) Pathways for hazardous substance dispersion.

(vii) Present status and capabilities of emergency response teams that would provide assistance to hazardous waste clean-up site employees at the time of an emergency

(viii) Hazardous substances and health hazards involved or expected at the site, and their chemical and physical properties.

(5) *Personal protective equipment.* Personal protective equipment (PPE) shall be provided and used during initial site entry in accordance with the following requirements.

(i) Based upon the results of the preliminary site evaluation, an ensemble of PPE shall be selected and used during initial site entry which will provide protection to a level of exposure below permissible exposure limits and published exposure levels for known or suspected hazardous substances and health hazards, and which will provide protection against other known and suspected hazards identified during the preliminary site evaluation. If there is no permissible exposure limit or published exposure level, the employer may use other published studies and information as a guide to appropriate personal protective equipment.

(ii) If positive-pressure self-contained breathing apparatus is not used as part of the entry ensemble, and if respiratory protection is warranted by the potential hazards identified during the preliminary site evaluation, an escape self-contained breathing apparatus of at least five minute's duration shall be carried by employees during initial site entry

(iii) If the preliminary site evaluation does not produce sufficient information to identify the hazards or suspected hazards of the site, an ensemble providing protection equivalent to Level B PPE shall be provided as minimum protection and direct reading instruments shall be used as appropriate for identifying IDLH conditions. (See Appendix B for a description of Level B hazards and the recommendations for Level B protective equipment.)

(iv) Once the hazards of the site have been identified, the appropriate PPE shall be selected and used in accordance with paragraph (g) of this section

(6) *Monitoring* The following monitoring shall be conducted during initial site entry when the site evaluation produces information that shows the potential for ionizing radiation or IDLH conditions or when the site informa-

tion is not sufficient reasonably to eliminate these possible conditions:

(i) Monitoring with direct reading instruments for hazardous levels of ionizing radiation.

(ii) Monitoring the air with appropriate direct reading test equipment (i.e., combustible gas meters, detector tubes) for IDLH and other conditions that may cause death or serious harm (combustible or explosive atmospheres, oxygen deficiency, toxic substances)

(iii) Visually observing for signs of actual or potential IDLH or other dangerous conditions.

(iv) An ongoing air monitoring program in accordance with paragraph (h) of this section shall be implemented after site characterization has determined the site is safe for the start-up of operations

(7) *Risk identification.* Once the presence and concentrations of specific hazardous substances and health hazards have been established, the risks associated with these substances shall be identified. Employees who will be working on the site shall be informed of any risks that have been identified. In situations covered by the Hazard Communication Standard, 29 CFR 1910.1200, training required by that standard need not be duplicated.

Note to (c)(7) — Risks to consider include, but are not limited to:

(a) Exposures exceeding the permissible exposure limits and published exposure levels.

(b) IDLH concentrations.

(c) Potential skin absorption and irritation sources.

(d) Potential eye irritation sources.

(e) Explosion sensitivity and flammability ranges.

(f) Oxygen deficiency

(8) *Employee notification.* Any information concerning the chemical, physical, and toxicologic properties of each substance known or expected to be present on site that is available to the employer and relevant to the duties an employee is expected to perform shall be made available to the affected employees prior to the commencement of their work activities. The employer may utilize information developed for the hazard communication standard for this purpose.

(d) *Site control*—(1) *General.* Appropriate site control procedures shall be implemented to control employee exposure to hazardous substances before clean-up work begins.

(2) *Site control program.* A site control program for protecting employees which is part of the employer's site safety and health program required in paragraph (b) of this section shall be developed during the planning stages of a hazardous waste clean-up operation and modified as necessary as new information becomes available.

(3) *Elements of the site control program.* The site control program shall, as a minimum, include: A site map, site work zones; the use of a "buddy system", site communications including alerting means for emergencies, the standard operating procedures or safe work practices; and, identification of the nearest medical assistance. Where these requirements are covered elsewhere they need not be repeated.

(e) *Training*—(1) *General.* (i) All employees working on site (such as but not limited to equipment operators, general laborers and others) exposed to hazardous substances, health hazards or safety hazards and their supervisors and management responsible for the site shall receive training meeting the requirements of this paragraph before they are permitted to engage in hazardous waste operations that could expose them to hazardous substances, safety or health hazards, and they shall receive review training as specified in this paragraph.

(ii) Employees shall not be permitted to participate in or supervise field activities until they have been trained to a level required by their job function and responsibility

(2) *Elements to be covered.* The training shall thoroughly cover the following:

(i) Names of personnel and alternates responsible for site safety and health.

(ii) Safety, health and other hazards present on the site.

(iii) Use of personal protective equipment;

(iv) Work practices by which the employee can minimize risks from hazards.

(v) Safe use of engineering controls and equipment on the site;

(vi) Medical surveillance requirements, including recognition of symptoms and signs which might indicate overexposure to hazards; and

(vii) The contents of paragraphs (G) through (J) of the site safety and health plan set forth in paragraph (b)(4)(ii) of this section.

[Sec. 1910.120(e)(2)(vii)]

(3) *Initial training.* (i) General site workers (such as equipment operators, general laborers and supervisory personnel) engaged in hazardous substance removal or other activities which expose or potentially expose workers to hazardous substances and health hazards shall receive a minimum of 40 hours of instruction off the site, and a minimum of three days actual field experience under the direct supervision of a trained, experienced supervisor.

(ii) Workers on site only occasionally for a specific limited task (such as, but not limited to, ground water monitoring, land surveying, or geo-physical surveying) and who are unlikely to be exposed over permissible exposure limits and published exposure limits shall receive a minimum of 24 hours of instruction off the site, and the minimum of one day actual field experience under the direct supervision of a trained, experienced supervisor.

(iii) Workers regularly on site who work in areas which have been monitored and fully characterized indicating that exposures are under permissible exposure limits and published exposure limits where respirators are not necessary, and the characterization indicates that there are no health hazards or the possibility of an emergency developing, shall receive a minimum of 24 hours of instruction off the site and the minimum of one day actual field experience under the direct supervision of a trained, experienced supervisor.

(iv) Workers with 24 hours of training who are covered by paragraphs (e)(3)(ii) and (e)(3)(iii) of this section, and who become general site workers or who are required to wear respirators, shall have the additional 16 hours and two days of training necessary to total the training specified in paragraph (e)(3)(i).

[Sec 1910.120(e)(3)(iv) revised, effective April 13, 1990, by 55 FR 14073, April 13, 1990]

(4) *Management and supervisor training.* On-site management and supervisors directly responsible for, or who supervise employees engaged in, hazardous waste operations shall receive 40 hours initial training, and three days of supervised field experience (the training may be reduced to 24 hours and one day if the only area of their responsibility is employees covered by paragraphs (e)(3)(ii) and (e)(3)(iii)) and at least eight additional hours of specialized training at the time of job assignment on such topics as, but not limited to, the employer's

safety and health program and the associated employee training program, personal protective equipment program, spill containment program, and health hazard monitoring procedure and techniques.

(5) *Qualifications for trainers.* Trainers shall be qualified to instruct employees about the subject matter that is being presented in training. Such trainers shall have satisfactorily completed a training program for teaching the subjects they are expected to teach, or they shall have the academic credentials and instructional experience necessary for teaching the subjects. Instructors shall demonstrate competent instructional skills and knowledge of the applicable subject matter.

(6) *Training certification.* Employees and supervisors that have received and successfully completed the training and field experience specified in paragraphs (e)(1) through (e)(4) of this section shall be certified by their instructor or the head instructor and trained supervisor as having successfully completed the necessary training. A written certificate shall be given to each person so certified. Any person who has not been so certified or who does not meet the requirements of paragraph (e)(9) of this section shall be prohibited from engaging in hazardous waste operations.

(7) *Emergency response.* Employees who are engaged in responding to hazardous emergency situations at hazardous waste clean-up sites that may expose them to hazardous substances shall be trained in how to respond to such expected emergencies.

(8) *Refresher training.* Employees specified in paragraph (e)(1) of this section, and managers and supervisors specified in paragraph (e)(4) of this section, shall receive eight hours of refresher training annually on the items specified in paragraph (e)(2) and/or (e)(4) of this section, any critique of incidents that have occurred in the past year that can serve as training examples of related work, and other relevant topics.

(9) *Equivalent training.* Employers who can show by documentation or certification that an employee's work experience and/or training has resulted in training equivalent to that training required in paragraphs (e)(1) through (e)(4) of this section shall not be required to provide the initial training requirements of those paragraphs to

such employees. However, certified employees or employees with equivalent training new to a site shall receive appropriate, site specific training before site entry and have appropriate supervised field experience at the new site. Equivalent training includes any academic training or the training that existing employees might have already received from actual hazardous waste site work experience.

[Sec 1910.120(e)(9) revised effective April 13 1990, by 55 FR 14073, April 13 1990]

(f) *Medical surveillance.* (1) *General.* Employers engaged in operations specified in paragraphs (a)(1)(i) through (a)(1)(iv) of this section and not covered by (a)(2)(iii) exceptions and employers of employees specified in paragraph (q)(9) shall institute a medical surveillance program in accordance with this paragraph.

(2) *Employees covered.* The medical surveillance program shall be instituted by the employer for the following employees:

(i) All employees who are or may be exposed to hazardous substances or health hazards at or above the permissible exposure limits or, if there is no permissible exposure limit, above the published exposure levels for these substances, without regard to the use of respirators, for 30 days or more a year.

(ii) All employees who wear a respirator for 30 days or more a year or as required by § 1910.134.

(iii) All employees who are injured become ill or develop signs or symptoms due to possible overexposure involving hazardous substances or health hazards from an emergency response or hazardous waste operation and

[1910.120(f)(2)(iii) revised effective April 13 1990 by 55 FR 14073 April 13 1990]

(iv) Members of HAZMAT teams

(3) *Frequency of medical examinations and consultations.* Medical examinations and consultations shall be made available by the employer to each employee covered under paragraph (f)(2) of this section on the following schedules

(i) For employees covered under paragraphs (f)(2)(i), (f)(2)(ii) and (f)(2)(iv)

(A) Prior to assignment.

(B) At least once every twelve months for each employee covered unless the attending physician believes a longer interval (not greater than biennially) is appropriate.

(C) At termination of employment or reassignment to an area where the em-

[Sec. 1910.120(f)(3)(i)(C)]

employee would not be covered if the employee has not had an examination within the last six months:

(D) As soon as possible upon notification by an employee that the employee has developed signs or symptoms indicating possible overexposure to hazardous substances or health hazards, or that the employee has been injured or exposed above the permissible exposure limits or published exposure levels in an emergency situation:

(E) At more frequent times, if the examining physician determines that an increased frequency of examination is medically necessary

(ii) For employees covered under paragraph (f)(2)(iii) and for all employees including those of employers covered by paragraph (a)(1)(v) who may have been injured, received a health impairment, developed signs or symptoms which may have resulted from exposure to hazardous substances resulting from an emergency incident, or exposed during an emergency incident to hazardous substances at concentrations above the permissible exposure limits or the published exposure levels without the necessary personal protective equipment being used.

(A) As soon as possible following the emergency incident or development of signs or symptoms;

(B) At additional times, if the examining physician determines that follow-up examinations or consultations are medically necessary

(4) *Content of medical examinations and consultations* (i) Medical examinations required by paragraph (f)(3) of this section shall include a medical and work history (or updated history if one is in the employee's file) with special emphasis on symptoms related to the handling of hazardous substances and health hazards and to fitness for duty including the ability to wear any required PPE under conditions (i.e. temperature extremes) that may be expected at the work site

(ii) The content of medical examinations or consultations made available to employees pursuant to paragraph (f) shall be determined by the attending physician. The guidelines in the *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities* (See Appendix D, Reference #10) should be consulted.

(5) *Examination by a physician and costs* All medical examinations and procedures shall be performed by or un-

der the supervision of a licensed physician, preferably one knowledgeable in occupational medicine, and shall be provided without cost to the employee, without loss of pay, and at a reasonable time and place.

(6) *Information provided to the physician.* The employer shall provide one copy of this standard and its appendices to the attending physician, and in addition the following for each employee:

(i) A description of the employee's duties as they relate to the employee's exposures.

(ii) The employee's exposure levels or anticipated exposure levels.

(iii) A description of any personal protective equipment used or to be used.

(iv) Information from previous medical examinations of the employee which is not readily available to the examining physician.

(v) Information required by § 1910.134

(7) *Physician's written opinion.* (i) The employer shall obtain and furnish the employee with a copy of a written opinion from the attending physician containing the following:

(A) The physician's opinion as to whether the employee has any detected medical conditions which would place the employee at increased risk of material impairment of the employee's health from work in hazardous waste operations or emergency response, or from respirator use.

(B) The physician's recommended limitations upon the employee's assigned work.

(C) The results of the medical examination and tests if requested by the employee

(D) A statement that the employee has been informed by the physician of the results of the medical examination and any medical conditions which require further examination or treatment.

(ii) The written opinion obtained by the employer shall not reveal specific findings or diagnoses unrelated to occupational exposures.

(8) *Recordkeeping* (i) An accurate record of the medical surveillance required by paragraph (f) of this section shall be retained. This record shall be retained for the period specified and meet the criteria of 29 CFR 1910.20

(ii) The record required in paragraph (f)(8)(i) of this section shall include at least the following information

(A) The name and social security number of the employee.

(B) Physician's written opinions, recommended limitations, and results of examinations and tests;

(C) Any employee medical complaints related to exposure to hazardous substances;

(D) A copy of the information provided to the examining physician by the employer, with the exception of the standard and its appendices.

(g) *Engineering controls, work practices, and personal protective equipment for employee protection.* Engineering controls, work practices, personal protective equipment, or a combination of these shall be implemented in accordance with this paragraph to protect employees from exposure to hazardous substances and safety and health hazards.

(i) *Engineering controls, work practices and PPE for substances regulated in Subparts G and Z* (i) Engineering controls and work practices shall be instituted to reduce and maintain employee exposure to or below the permissible exposure limits for substances regulated by 29 CFR Part 1910 to the extent required by Subpart Z, except to the extent that such controls and practices are not feasible

Note to (g)(1)(i): Engineering controls which may be feasible include the use of pressurized cabs or control booths on equipment, and/or the use of remotely operated material handling equipment. Work practices which may be feasible are removing all non-essential employees from potential exposure during opening of drums, wetting down dusty operations and locating employees upwind of possible hazards.

(ii) Whenever engineering controls and work practices are not feasible or not required, any reasonable combination of engineering controls, work practices and PPE shall be used to reduce and maintain employee exposures to or below the permissible exposure limits or dose limits for substances regulated by 29 CFR Part 1910, Subpart Z.

[1910.120(g)(1)(ii) revised, effective April 13 1990, by 55 FR 14073 April 13 1990]

(iii) The employer shall not implement a schedule of employee rotation as a means of compliance with permissible exposure limits or dose limits except when there is no other feasible way of complying with the airborne or dermal dose limits for ionizing radiation.

[Sec. 1910.120(g)(1)(iii)]

(iv) The provisions of 29 CFR, Subpart G shall be followed.

(2) *Engineering controls, work practices, and PPE for substances not regulated in Subparts G and Z.* An appropriate combination of engineering controls, work practices and personal protective equipment shall be used to reduce and maintain employee exposure to or below published exposure levels for hazardous substances and health hazards not regulated by 29 CFR Part 1910, Subparts G and Z. The employer may use the published literature and MSDS as a guide in making the employer's determination as to what level of protection the employer believes is appropriate for hazardous substances and health hazards for which there is no permissible exposure limit or published exposure limit.

(3) *Personal protective equipment selection.* (i) Personal protective equipment (PPE) shall be selected and used which will protect employees from the hazards and potential hazards they are likely to encounter as identified during the site characterization and analysis.

(ii) Personal protective equipment selection shall be based on an evaluation of the performance characteristics of the PPE relative to the requirements and limitations of the site, the task-specific conditions and duration, and the hazards and potential hazards identified at the site.

(iii) Positive pressure self-contained breathing apparatus, or positive pressure air-line respirators equipped with an escape air supply, shall be used when chemical exposure levels present will create a substantial possibility of immediate death, immediate serious illness or injury, or impair the ability to escape.

(iv) Totally-encapsulating chemical protective suits (protection equivalent to Level A protection as recommended in Appendix B) shall be used in conditions where skin absorption of a hazardous substance may result in a substantial possibility of immediate death, immediate serious illness or injury, or impair the ability to escape.

(v) The level of protection provided by PPE selection shall be increased when additional information on site conditions indicates that increased protection is necessary to reduce employee exposures below permissible exposure limits and published exposure levels for hazardous substances and health haz-

ards. (See Appendix B for guidance on selecting PPE ensembles.)

Note to (v)(3): The level of employee protection provided may be decreased when additional information or site conditions show that decreased protection will not result in hazardous exposures to employees.

(vi) Personal protective equipment shall be selected and used to meet the requirements of 29 CFR Part 1910, Subpart I, and additional requirements specified in this section.

(4) *Totally-encapsulating chemical protective suits.* (i) Totally-encapsulating suits shall protect employees from the particular hazards which are identified during site characterization and analysis.

(ii) Totally-encapsulating suits shall be capable of maintaining positive air pressure. (See Appendix A for a test method which may be used to evaluate this requirement.)

(iii) Totally-encapsulating suits shall be capable of preventing inward test gas leakage of more than 0.5 percent. (See Appendix A for a test method which may be used to evaluate this requirement.)

(5) *Personal protective equipment (PPE) program.* A written personal protective equipment program, which is part of the employer's safety and health program required in paragraph (b) of this section or required in paragraph (p)(1) of this section and which is also a part of the site-specific safety and health plan shall be established. The PPE program shall address the elements listed below. When elements, such as donning and doffing procedures are provided by the manufacturer of a piece of equipment and are attached to the plan, they need not be rewritten into the plan as long as they adequately address the procedure or element.

(i) PPE selection based upon site hazards.

(ii) PPE use and limitations of the equipment.

(iii) Work mission duration.

(iv) PPE maintenance and storage.

(v) PPE decontamination and disposal.

(vi) PPE training and proper fitting.

(vii) PPE donning and doffing procedures.

(viii) PPE inspection procedures prior to, during, and after use.

(ix) Evaluation of the effectiveness of the PPE program, and

(x) Limitations during temperature extremes, heat stress, and other appropriate medical considerations.

(h) *Monitoring—(1) General.* (i) Monitoring shall be performed in accordance with this paragraph where there may be a question of employee exposure to hazardous concentrations of hazardous substances in order to assure proper selection of engineering controls, work practices and personal protective equipment so that employees are not exposed to levels which exceed permissible exposure limits, or published exposure levels if there are no permissible exposure limits, for hazardous substances.

[1910.120(h)(1)(i) revised effective April 13 1990, by 55 FR 14073 April 13 1990]

(ii) Air monitoring shall be used to identify and quantify airborne levels of hazardous substances and safety and health hazards in order to determine the appropriate level of employee protection needed on site.

(2) *Initial entry.* Upon initial entry, representative air monitoring shall be conducted to identify any IDLH condition, exposure over permissible exposure limits or published exposure levels exposure over a radioactive material's dose limits or other dangerous condition such as the presence of flammable atmospheres or oxygen-deficient environments.

(3) *Periodic monitoring.* Periodic monitoring shall be conducted when the possibility of an IDLH condition or flammable atmosphere has developed or when there is indication that exposures may have risen over permissible exposure limits or published exposure levels since prior monitoring. Situations where it shall be considered whether the possibility that exposures have risen are as follows.

(i) When work begins on a different portion of the site.

(ii) When contaminants other than those previously identified are being handled.

(iii) When a different type of operation is initiated (e.g., drum opening as opposed to exploratory well drilling).

(iv) When employees are handling leaking drums or containers or working in areas with obvious liquid contamination (e.g., a spill or lagoon).

(4) *Monitoring of high-risk employees.* After the actual clean-up phase of any hazardous waste operation commences, for example, when soil, surface water or

[Sec 1910.120(h)(4)]

containers are moved or disturbed: the employer shall monitor those employees likely to have the highest exposures to hazardous substances and health hazards likely to be present above permissible exposure limits or published exposure levels by using personal sampling frequently enough to characterize employee exposures. If the employees likely to have the highest exposure are over permissible exposure limits or published exposure limits, then monitoring shall continue to determine all employees likely to be above those limits. The employer may utilize a representative sampling approach by documenting that the employees and chemicals chosen for monitoring are based on the criteria stated above.

Note to (h): It is not required to monitor employees engaged in site characterization operations covered by paragraph (c) of this section.

(i) *Informational programs* Employers shall develop and implement a program, which is part of the employer's safety and health program required in paragraph (b) of this section, to inform employees, contractors and subcontractors (or their representative) actually engaged in hazardous waste operations of the nature level and degree of exposure likely as a result of participation in such hazardous waste operations. Employees, contractors and subcontractors working outside of the operations part of a site are not covered by this standard.

(j) *Handling drums and containers*—(1) *General.* (i) Hazardous substances and contaminated soils, liquids, and other residues shall be handled, transported, labeled, and disposed of in accordance with this paragraph.

(ii) Drums and containers used during the clean-up shall meet the appropriate DOT, OSHA, and EPA regulations for the wastes that they contain.

(iii) When practical, drums and containers shall be inspected and their integrity shall be assured prior to being moved. Drums or containers that cannot be inspected before being moved because of storage conditions (i.e., buried beneath the earth, stacked behind other drums stacked several tiers high in a pile, etc.) shall be moved to an accessible location and inspected prior to further handling.

(iv) Unlabelled drums and containers shall be considered to contain hazardous substances and handled accordingly until the contents are positively identified and labeled.

(v) Site operations shall be organized to minimize the amount of drum or container movement.

(vi) Prior to movement of drums or containers, all employees exposed to the transfer operation shall be warned of the potential hazards associated with the contents of the drums or containers.

(vii) U.S. Department of Transportation specified salvage drums or containers and suitable quantities of proper absorbent shall be kept available and used in areas where spills, leaks, or ruptures may occur.

(viii) Where major spills may occur, a spill containment program, which is part of the employer's safety and health program required in paragraph (b) of this section, shall be implemented to contain and isolate the entire volume of the hazardous substance being transferred.

(ix) Drums and containers that cannot be moved without rupture, leakage, or spillage shall be emptied into a sound container using a device classified for the material being transferred.

(x) A ground-penetrating system or other type of detection system or device shall be used to estimate the location and depth of buried drums or containers.

(xi) Soil or covering material shall be removed with caution to prevent drum or container rupture.

(xii) Fire extinguishing equipment meeting the requirements of 29 CFR Part 1910, Subpart L, shall be on hand and ready for use to control incipient fires.

(2) *Opening drums and containers.* The following procedures shall be followed in areas where drums or containers are being opened.

(i) Where an airline respirator system is used, connections to the source of air supply shall be protected from contamination and the entire system shall be protected from physical damage.

(ii) Employees not actually involved in opening drums or containers shall be kept a safe distance from the drums or containers being opened.

(iii) If employees must work near or adjacent to drums or containers being opened, a suitable shield that does not interfere with the work operation shall be placed between the employee and the drums or containers being opened to protect the employee in case of accidental explosion.

(iv) Controls for drum or container opening equipment, monitoring equipment, and fire suppression equipment shall be located behind the explosion-resistant barrier.

(v) When there is a reasonable possibility of flammable atmospheres being present, material handling equipment and hand tools shall be of the type to prevent sources of ignition.

(vi) Drums and containers shall be opened in such a manner that excess interior pressure will be safely relieved. If pressure can not be relieved from a remote location, appropriate shielding shall be placed between the employee and the drums or containers to reduce the risk of employee injury.

(vii) Employees shall not stand upon or work from drums or containers.

(3) *Material handling equipment.* Material handling equipment used to transfer drums and containers shall be selected, positioned and operated to minimize sources of ignition related to the equipment from igniting vapors released from ruptured drums or containers.

(4) *Radioactive wastes.* Drums and containers containing radioactive wastes shall not be handled until such time as their hazard to employees is properly assessed.

(5) *Shock sensitive wastes.* As a minimum, the following special precautions shall be taken when drums and containers containing or suspected of containing shock-sensitive wastes are handled.

(i) All non-essential employees shall be evacuated from the area of transfer.

(ii) Material handling equipment shall be provided with explosive containment devices or protective shields to protect equipment operators from exploding containers.

(iii) An employee alarm system capable of being perceived above surrounding light and noise conditions shall be used to signal the commencement and completion of explosive waste handling activities.

(iv) Continuous communications (i.e., portable radios, hand signals, telephones, as appropriate) shall be maintained between the employee-in-charge of the immediate handling area and both the site safety and health supervisor and the command post until such time as the handling operation is completed. Communication equipment or methods that could cause shock sensi-

[Sec. 1910.120(j)(5)(iv)]

tive materials to explode shall not be used.

(v) Drums and containers under pressure, as evidenced by bulging or swelling, shall not be moved until such time as the cause for excess pressure is determined and appropriate containment procedures have been implemented to protect employees from explosive relief of the drum.

(vi) Drums and containers containing packaged laboratory wastes shall be considered to contain shock-sensitive or explosive materials until they have been characterized.

Caution: Shipping of shock sensitive wastes may be prohibited under U.S. Department of Transportation regulations. Employers and their shippers should refer to 49 CFR 173.21 and 173.50.

(6) *Laboratory waste packs* In addition to the requirements of paragraph (j)(5) of this section, the following precautions shall be taken, as a minimum, in handling laboratory waste packs (lab packs)

(i) Lab packs shall be opened only when necessary and then only by an individual knowledgeable in the inspection, classification, and segregation of the containers within the pack according to the hazards of the wastes

(ii) If crystalline material is noted on any container the contents shall be handled as a shock-sensitive waste until the contents are identified.

(7) *Sampling of drum and container contents* Sampling of containers and drums shall be done in accordance with a sampling procedure which is part of the site safety and health plan developed for and available to employees and others at the specific worksite

(8) *Shipping and transport.* (i) Drums and containers shall be identified and classified prior to packaging for shipment.

(ii) Drum or container staging areas shall be kept to the minimum number necessary to identify and classify materials safely and prepare them for transport

(iii) Staging areas shall be provided with adequate access and egress routes.

(iv) Bulking of hazardous wastes shall be permitted only after a thorough characterization of the materials has been completed.

(9) *Tank and vault procedures* (i) Tanks and vaults containing hazardous substances shall be handled in a

manner similar to that for drums and containers, taking into consideration the size of the tank or vault.

(ii) Appropriate tank or vault entry procedures as described in the employer's safety and health plan shall be followed whenever employees must enter a tank or vault.

(k) *Decontamination*—(1) *General.* Procedures for all phases of decontamination shall be developed and implemented in accordance with this paragraph.

(2) *Decontamination procedures* (i) A decontamination procedure shall be developed, communicated to employees and implemented before any employees or equipment may enter areas on site where potential for exposure to hazardous substances exists.

(ii) Standard operating procedures shall be developed to minimize employee contact with hazardous substances or with equipment that has contacted hazardous substances.

(iii) All employees leaving a contaminated area shall be appropriately decontaminated, all contaminated clothing and equipment leaving a contaminated area shall be appropriately disposed of or decontaminated.

(iv) Decontamination procedures shall be monitored by the site safety and health supervisor to determine their effectiveness. When such procedures are found to be ineffective, appropriate steps shall be taken to correct any deficiencies.

(3) *Location.* Decontamination shall be performed in geographical areas that will minimize the exposure of uncontaminated employees or equipment to contaminated employees or equipment.

(4) *Equipment and solvents.* All equipment and solvents used for decontamination shall be decontaminated or disposed of properly

(5) *Personal protective clothing and equipment* (i) Protective clothing and equipment shall be decontaminated, cleaned, laundered, maintained or replaced as needed to maintain their effectiveness

(ii) Employees whose non-impermeable clothing becomes wetted with hazardous substances shall immediately remove that clothing and proceed to shower. The clothing shall be disposed of or decontaminated before it is removed from the work zone

(6) *Unauthorized employees* Unauthorized employees shall not remove protective clothing or equipment from change rooms.

(7) *Commercial laundries or cleaning establishments* Commercial laundries or cleaning establishments that decontaminate protective clothing or equipment shall be informed of the potentially harmful effects of exposures to hazardous substances.

(8) *Showers and change rooms.* Where the decontamination procedure indicates a need for regular showers and change rooms outside of a contaminated area, they shall be provided and meet the requirements of 29 CFR 1910.141. If temperature conditions prevent the effective use of water, then other effective means for cleansing shall be provided and used.

(i) *Emergency response by employees at uncontrolled hazardous waste sites*—(1) *Emergency response plan.* (i) An emergency response plan shall be developed and implemented by all employers within the scope of paragraphs (a)(1)(i)–(ii) of this section to handle anticipated emergencies prior to the commencement of hazardous waste operations. The plan shall be in writing and available for inspection and copying by employees, their representatives, OSHA personnel and other governmental agencies with relevant responsibilities.

[1910.120(l)(1)(i) revised effective April 13, 1990 by 55 FR 14073, April 13, 1990]

(ii) Employers who will evacuate their employees from the danger area when an emergency occurs, and who do not permit any of their employees to assist in handling the emergency, are exempt from the requirements of this paragraph if they provide an emergency action plan complying with section 1910.38(a) of this part.

[1910.120(l)(1)(ii) revised, effective April 13, 1990 by 55 FR 14073, April 13, 1990]

(2) *Elements of an emergency response plan.* The employer shall develop an emergency response plan for emergencies which shall address, as a minimum, the following:

(i) Pre-emergency planning

(ii) Personnel roles, lines of authority, and communication.

(iii) Emergency recognition and prevention.

(iv) Safe distances and places of refuge.

(v) Site security and control.

[Sec. 1910.120(l)(2)(v)]

(vi) Evacuation routes and procedures.

(vii) Decontamination procedures which are not covered by the site safety and health plan.

(viii) Emergency medical treatment and first aid.

(ix) Emergency alerting and response procedures.

(x) Critique of response and follow-up

(xi) PPE and emergency equipment.

(3) *Procedures for handling emergency incidents* (i) In addition to the elements for the emergency response plan required in paragraph (1)(2) of this section, the following elements shall be included for emergency response plans:

(A) Site topography, layout, and prevailing weather conditions.

(B) Procedures for reporting incidents to local, state, and federal governmental agencies

(ii) The emergency response plan shall be a separate section of the Site Safety and Health Plan.

(iii) The emergency response plan shall be compatible and integrated with the disaster, fire and/or emergency response plans of local, state, and federal agencies

(iv) The emergency response plan shall be rehearsed regularly as part of the overall training program for site operations.

(v) The site emergency response plan shall be reviewed periodically and, as necessary, be amended to keep it current with new or changing site conditions or information

(vi) An employee alarm system shall be installed in accordance with 29 CFR 1910.165 to notify employees of an emergency situation, to stop work activities if necessary; to lower background noise in order to speed communication, and to begin emergency procedures

(vii) Based upon the information available at time of the emergency, the employer shall evaluate the incident and the site response capabilities and proceed with the appropriate steps to implement the site emergency response plan

(m) *Illumination.* Areas accessible to employees shall be lighted to not less than the minimum illumination intensities listed in the following Table H-120.1 while any work is in progress

TABLE H-120.1—Minimum Illumination Intensities in Foot-Candles

Foot-candles	Area or operations
5	General site areas.
3	Excavation and waste areas, accessways, active storage areas, loading platforms, refueling, and field maintenance areas.
5	Indoors. Warehouses, corridors, hall ways, and stairways.
5	Tunnels, shafts, and general underground work areas. (Exception: Minimum of 10 foot-candles is required at tunnel and shaft heading during drilling, mucking, and scaling. Mine Safety and Health Administration approved cap lights shall be acceptable for use in the tunnel heading.)
10	General shops (e.g., mechanical and electrical equipment rooms, active storerooms, barracks or living quarters locker or dressing rooms, dining areas, and indoor toilets and workrooms.)
50	First aid stations, infirmaries, and offices.

(n) *Sanitation at temporary work-places*—(1) *Potable water* (i) An adequate supply of potable water shall be provided on the site.

(ii) Portable containers used to dispense drinking water shall be capable of being tightly closed, and equipped with a tap. Water shall not be dipped from containers.

(iii) Any container used to distribute drinking water shall be clearly marked as to the nature of its contents and not used for any other purpose

(iv) Where single service cups (to be used but once) are supplied, both a sanitary container for the unused cups and a receptacle for disposing of the used cups shall be provided.

(2) *Nonpotable water* (i) Outlets for nonpotable water, such as water for fire-fighting purposes, shall be identified to indicate clearly that the water is unsafe and is not to be used for drinking, washing, or cooking purposes.

(ii) There shall be no cross-connection, open or potential, between a system furnishing potable water and a system furnishing nonpotable water

(3) *Toilet facilities* (i) Toilets shall be provided for employees according to the following Table H-120.2

TABLE H-120.2—TOILET FACILITIES

Number of employees	Minimum number of facilities
20 or fewer	One.
More than 20 fewer than 200	One toilet seat and one urinal per 40 employees.
More than 200	One toilet seat and one urinal per 50 employees.

(ii) Under temporary field conditions provisions shall be made to assure that at least one toilet facility is available

(iii) Hazardous waste sites not provided with a sanitary sewer shall be provided with the following toilet facilities unless prohibited by local codes

(A) Chemical toilets;

(B) Recirculating toilets.

(C) Combustion toilets; or

(D) Flush toilets.

(iv) The requirements of this paragraph for sanitation facilities shall not apply to mobile crews having transportation readily available to nearby toilet facilities.

(v) Doors entering toilet facilities shall be provided with entrance locks controlled from inside the facility

(4) *Food handling* All food service facilities and operations for employees shall meet the applicable laws, ordinances and regulations of the jurisdictions in which they are located.

(5) *Temporary sleeping quarters* When temporary sleeping quarters are provided, they shall be heated, ventilated, and lighted.

(6) *Washing facilities.* The employer shall provide adequate washing facilities for employees engaged in operations where hazardous substances may be harmful to employees. Such facilities shall be in near proximity to the worksite; in areas where exposures are below permissible exposure limits and published exposure levels and which are under the controls of the employer and shall be so equipped as to enable employees to remove hazardous substances from themselves.

(7) *Showers and change rooms* When hazardous waste clean-up or removal operations commence on a site and the duration of the work will require six months or greater time to complete, the employer shall provide showers and change rooms for all employees exposed

[Sec 1910.120(n)(7)]

to hazardous substances and health hazards involved in hazardous waste clean-up or removal operations.

(i) Showers shall be provided and shall meet the requirements of 29 CFR 1910.141(d)(3)

(ii) Change rooms shall be provided and shall meet the requirements of 29 CFR 1910.141(e). Change rooms shall consist of two separate change areas separated by the shower area required in paragraph (n)(7)(i) of this section. One change area, with an exit leading off the worksite, shall provide employees with a clean area where they can remove, store, and put on street clothing. The second area, with an exit to the worksite, shall provide employees with an area where they can put on, remove and store work clothing and personal protective equipment.

(iii) Showers and change rooms shall be located in areas where exposures are below the permissible exposure limits and published exposure levels. If this cannot be accomplished, then a ventilation system shall be provided that will supply air that is below the permissible exposure limits and published exposure levels.

(iv) Employers shall assure that employees shower at the end of their work shift and when leaving the hazardous waste site.

(o) *New technology programs* (1) The employer shall develop and implement procedures for the introduction of effective new technologies and equipment developed for the improved protection of employees working with hazardous waste clean-up operations, and the same shall be implemented as part of the site safety and health program to assure that employee protection is being maintained.

(2) New technologies, equipment or control measures available to the industry, such as the use of foams, absorbents, adsorbents, neutralizers, or other means to suppress the level of air contaminants while excavating the site or for spill control, shall be evaluated by employers or their representatives. Such an evaluation shall be done to determine the effectiveness of the new methods, materials or equipment before implementing their use on a large scale for enhancing employee protection. Information and data from manufacturers or suppliers may be used as part of the employer's evaluation effort. Such evaluations shall be made available to OSHA upon request.

(p) *Certain Operations Conducted Under the Resource Conservation and Recovery Act of 1976 (RCRA)* Employers conducting operations at treatment, storage and disposal (TSD) facilities specified in paragraph (a)(1)(iv) of this section shall provide and implement the programs specified in this paragraph. See the "Notes and Exceptions" to paragraph (a)(2)(iii) of this section for employers not covered.

[1910.120(p) revised, effective April 13, 1990, by 55 FR 14073, April 13, 1990]

(1) *Safety and health program.* The employer shall develop and implement a written safety and health program for employees involved in hazardous waste operations that shall be available for inspection by employees, their representatives and OSHA personnel. The program shall be designed to identify, evaluate and control safety and health hazards in their facilities for the purpose of employee protection, to provide for emergency response meeting the requirements of paragraph (p)(8) of this section and to address as appropriate site analysis, engineering controls, maximum exposure limits, hazardous waste handling procedures and uses of new technologies.

(2) *Hazard communication program.* The employer shall implement a hazard communication program meeting the requirements of 29 CFR 1910.1200 as part of the employer's safety and program.

Note to 1910.120.—The exemption for hazardous waste provided in § 1910.1200 is applicable to this section.

(3) *Medical surveillance program.* The employer shall develop and implement a medical surveillance program meeting the requirements of paragraph (f) of this section.

(4) *Decontamination program.* The employer shall develop and implement a decontamination procedure meeting the requirements of paragraph (k) of this section.

(5) *New technology program.* The employer shall develop and implement procedures meeting the requirements of paragraph (o) of this section for introducing new and innovative equipment into the workplace.

(6) *Material handling program.* Where employees will be handling drums or containers the employer shall develop and implement procedures meeting the requirements of paragraphs (j)(1) (ii) through (viii) and (xi) of this section, as well as (j)(3) and (j)(8) of this section prior to starting such work.

(7) *Training program*—(i) *New employees.* The employer shall develop and implement a training program, which is part of the employer's safety and health program, for employees exposed to health hazards or hazardous substances at TSD operations to enable the employees to perform their assigned duties and functions in a safe and healthful manner so as not endanger themselves or other employees. The initial training shall be for 24 hours and refresher training shall be for eight hours annually. Employees who have received the initial training required by this paragraph shall be given a written certificate attesting that they have successfully completed the necessary training.

[1910.120(p)(7)(i) revised effective April 13 1990, by 55 FR 14074, April 13 1990]

(ii) *Current employees.* Employers who can show by an employee's previous work experience and/or training that the employee has had training equivalent to the initial training required by this paragraph, shall be considered as meeting the initial training requirements of this paragraph as to that employee. Equivalent training includes the training that existing employees might have already received from actual site work experience. Current employees shall receive eight hours of refresher training annually.

(iii) *Trainers.* Trainers who teach initial training shall have satisfactorily completed a training course for teaching the subjects they are expected to teach or they shall have the academic credentials and instruction experience necessary to demonstrate a good command of the subject matter of the courses and competent instructional skills.

(8) *Emergency response program*—(i) *Emergency response plan.* An emergency response plan shall be developed and implemented by all employers. Such plans need not duplicate any of the subjects fully addressed in the employer's contingency planning required by permits, such as those issued by the U.S. Environmental Protection Agency, provided that the contingency plan is made part of the emergency response plan. The emergency response plan shall be a written portion of the employer's safety and health program required in paragraph (p)(1) of this section. Employers who will evacuate their employees from the worksite location when an emergency occurs and who do not permit any of their employees to

[Sec. 1910.120(p)(8)(i)]

assist in handling the emergency are exempt from the requirements of paragraph (p)(8) if they provide an emergency action plan complying with § 1910.38(a) of this part.

(ii) *Elements of an emergency response plan.* The employer shall develop an emergency response plan for emergencies which shall address, as a minimum, the following areas to the extent that they are not addressed in any specific program required in this paragraph.

(A) Pre-emergency planning and coordination with outside parties.

(B) Personnel roles, lines of authority, and communication.

(C) Emergency recognition and prevention.

(D) Safe distances and places of refuge

(E) Site security and control.

(F) Evacuation routes and procedures.

(G) Decontamination procedures

(H) Emergency medical treatment and first aid.

(I) Emergency alerting and response procedures

(J) Critique of response and follow-up

(K) PPE and emergency equipment.

(iii) *Training* (A) Training for emergency response employees shall be completed before they are called upon to perform in real emergencies. Such training shall include the elements of the emergency response plan, standard operating procedures the employer has established for the job, the personal protective equipment to be worn and procedures for handling emergency incidents

Exception #1 An employer need not train all employees to the degree specified if the employer divides the work force in a manner such that a sufficient number of employees who have responsibility to control emergencies have the training specified, and all other employees, who may first respond to an emergency incident, have sufficient awareness training to recognize that an emergency response situation exists and that they are instructed in that case to summon the fully trained employees and not attempt control activities for which they are not trained.

Exception #2 An employer need not train all employees to the degree specified if arrangements have been made in advance for an outside fully-trained emergency response team to respond in a reasonable period and all employees, who may come to the incident first, have sufficient awareness training to recognize that an emergency response situation exists and they have been instructed to

call the designated outside fully-trained emergency response team for assistance.

(B) Employee members of TSD facility emergency response organizations shall be trained to a level of competence in the recognition of health and safety hazards to protect themselves and other employees. This would include training in the methods used to minimize the risk from safety and health hazards; in the safe use of control equipment; in the selection and use of appropriate personal protective equipment; in the safe operating procedures to be used at the incident scene; in the techniques of coordination with other employees to minimize risks; in the appropriate response to over exposure from health hazards or injury to themselves and other employees; and in the recognition of subsequent symptoms which may result from over exposures.

(C) The employer shall certify that each covered employee has attended and successfully completed the training required in paragraph (p)(8)(iii) of this section, or shall certify the employee's competency at least yearly. The method used to demonstrate competency for certification of training shall be recorded and maintained by the employer

(iv) *Procedures for handling emergency incidents* (A) In addition to the elements for the emergency response plan required in paragraph (p)(8)(ii) of this section, the following elements shall be included for emergency response plans to the extent that they do not repeat any information already contained in the emergency response plan.

(1) Site topography, layout, and prevailing weather conditions.

(2) Procedures for reporting incidents to local, state and federal governmental agencies

(B) The emergency response plan shall be compatible and integrated with the disaster, fire and/or emergency response plans of local, state, and federal agencies.

(C) The emergency response plan shall be rehearsed regularly as part of the overall training program for site operations

(D) The site emergency response plan shall be reviewed periodically and, as necessary, be amended to keep it current with new or changing site conditions or information.

(E) An employee alarm system shall be installed in accordance with 29 CFR

1910.165 to notify employees of an emergency situation, to stop work activities if necessary, to lower background noise in order to speed communication, and to begin emergency procedures.

(F) Based upon the information available at time of the emergency, the employer shall evaluate the incident and the site response capabilities and proceed with the appropriate steps to implement the site emergency response plan.

(q) *Emergency response to hazardous substance releases.* This paragraph covers employers whose employees are engaged in emergency response no matter where it occurs except that it does not cover employees engaged in operations specified in paragraphs (a)(1)(i) through (a)(1)(iv) of this section. Those emergency response organizations who have developed and implemented programs equivalent to this paragraph for handling releases of hazardous substances pursuant to section 303 of the Superfund Amendments and Reauthorization Act of 1986 (Emergency Planning and Community Right-to-Know Act of 1986, 42 U.S.C. 11003) shall be deemed to have met the requirements of this paragraph.

(i) *Emergency response plan.* An emergency response plan shall be developed and implemented to handle anticipated emergencies prior to the commencement of emergency response operations. The plan shall be in writing and available for inspection and copying by employees, their representatives and OSHA personnel. Employers who will evacuate their employees from the danger area when an emergency occurs, and who do not permit any of their employees to assist in handling the emergency, are exempt from the requirements of this paragraph if they provide an emergency action plan in accordance with § 1910.38(a) of this part.

[1910.120(q)(1) revised, effective April 13, 1990, by 55 FR 14074, April 13, 1990]

(2) *Elements of an emergency response plan.* The employer shall develop an emergency response plan for emergencies which shall address, as a minimum, the following to the extent that they are not addressed elsewhere

(i) Pre-emergency planning and coordination with outside parties

(ii) Personnel roles, lines of authority, training, and communication

[Sec. 1910.120(q)(2)(ii)]

(iii) Emergency recognition and prevention.

(iv) Safe distances and places of refuge.

(v) Site security and control.

(vi) Evacuation routes and procedures.

(vii) Decontamination.

(viii) Emergency medical treatment and first aid.

(ix) Emergency alerting and response procedures.

(x) Critique of response and follow-up.

(xi) PPE and emergency equipment.

(xii) Emergency response organizations may use the local emergency response plan or the state emergency response plan or both, as part of their emergency response plan to avoid duplication. Those items of the emergency response plan that are being properly addressed by the SARA Title III plans may be substituted into their emergency plan or otherwise kept together for the employer and employee's use.

(3) *Procedures for handling emergency response.* (i) The senior emergency response official responding to an emergency shall become the individual in charge of a site-specific Incident Command System (ICS). All emergency responders and their communications shall be coordinated and controlled through the individual in charge of the ICS assisted by the senior official present for each employer.

*Note to (q)(3)(i) —*The "senior official" at an emergency response is the most senior official on the site who has the responsibility for controlling the operations at the site. Initially it is the senior officer on the first-due piece of responding emergency apparatus to arrive on the incident scene. As more senior officers arrive (i.e. battalion chief, fire chief, state law enforcement official, site coordinator, etc.) the position is passed up the line of authority which has been previously established.

(ii) The individual in charge of the ICS shall identify, to the extent possible, all hazardous substances or conditions present and shall address as appropriate site analysis, use of engineering controls, maximum exposure limits, hazardous substance handling procedures and use of any new technologies.

(iii) Based on the hazardous substances and/or conditions present, the individual in charge of the ICS shall implement appropriate emergency operations and assure that the personal protective equipment worn is appropriate

for the hazards to be encountered. However, personal protective equipment shall meet, at a minimum, the criteria contained in 29 CFR 1910.156(e) when worn while performing fire fighting operations beyond the incipient stage for any incident.

[1910.120(q)(3)(iii) revised, effective April 13, 1990, by 55 FR 14074, April 13, 1990]

(iv) Employees engaged in emergency response and exposed to hazardous substances presenting an inhalation hazard or potential inhalation hazard shall wear positive pressure self-contained breathing apparatus while engaged in emergency response, until such time that the individual in charge of the ICS determines through the use of air monitoring that a decreased level of respiratory protection will not result in hazardous exposures to employees.

(v) The individual in charge of the ICS shall limit the number of emergency response personnel at the emergency site, in those areas of potential or actual exposure to incident or site hazards, to those who are actively performing emergency operations. However, operations in hazardous areas shall be performed using the buddy system in groups of two or more.

(vi) Back-up personnel shall stand by with equipment ready to provide assistance or rescue. Advance first aid support personnel, as a minimum, shall also stand by with medical equipment and transportation capability.

(vii) The individual in charge of the ICS shall designate a safety official, who is knowledgeable in the operations being implemented at the emergency response site with specific responsibility to identify and evaluate hazards and to provide direction with respect to the safety of operations for the emergency at hand.

(viii) When activities are judged by the safety official to be an IDLH condition and/or to involve an imminent danger condition, the safety official shall have the authority to alter, suspend, or terminate those activities. The safety official shall immediately inform the individual in charge of the ICS of any actions needed to be taken to correct these hazards at the emergency scene.

[1910.120(q)(3)(viii) revised, effective April 13, 1990, by 55 FR 14074, April 13, 1990]

(ix) After emergency operations have terminated, the individual in charge of the ICS shall implement appropriate decontamination procedures.

(x) When deemed necessary for meeting the tasks at hand, approved self-contained compressed air breathing apparatus may be used with approved cylinders from other approved self-contained compressed air breathing apparatus provided that such cylinders are of the same capacity and pressure rating. All compressed air cylinders used with self-contained breathing apparatus shall meet U.S. Department of Transportation and National Institute for Occupational Safety and Health criteria.

(4) *Skilled support personnel.* Personnel, not necessarily an employer's own employees, who are skilled in the operation of certain equipment, such as mechanized earth moving or digging equipment or crane and hoisting equipment, and who are needed temporarily to perform immediate emergency support work that cannot reasonably be performed in a timely fashion by an employer's own employees, and who will be or may be exposed to the hazards at an emergency response scene, are not required to meet the training required in this paragraph for the employer's regular employees. However, these personnel shall be given an initial briefing at the site prior to their participation in any emergency response. The initial briefing shall include instruction in the wearing of appropriate personal protective equipment, what chemical hazards are involved, and what duties are to be performed. All other appropriate safety and health precautions provided to the employer's own employees shall be used to assure the safety and health of these personnel.

(5) *Specialist employees.* Employees who in the course of their regular job duties, work with and are trained in the hazards of specific hazardous substances, and who will be called upon to provide technical advice or assistance at a hazardous substance release incident to the individual in charge, shall receive training or demonstrate competency in the area of their specialization annually.

(6) *Training.* Training shall be based on the duties and function to be performed by each responder of an emergency response organization. The skill and knowledge levels required for all new responders those hired after the effective date of this standard, shall be conveyed to them through training before they are permitted to take part in actual emergency operations on an incident. Employees who participate or

[Sec. 1910.120(q)(6)]

are expected to participate. In emergency response, shall be given training in accordance with the following paragraphs.

(i) *First responder awareness level.* First responders at the awareness level are individuals who are likely to witness or discover a hazardous substance release and who have been trained to initiate an emergency response sequence by notifying the proper authorities of the release. They would take no further action beyond notifying the authorities of the release. First responders at the awareness level shall have sufficient training or have had sufficient experience to objectively demonstrate competency in the following areas.

(A) An understanding of what hazardous substances are and the risks associated with them in an incident.

(B) An understanding of the potential outcomes associated with an emergency created when hazardous substances are present.

(C) The ability to recognize the presence of hazardous substances in an emergency.

(D) The ability to identify the hazardous materials if possible.

[1910.120(q)(6)(i)] (A)-(D) revised effective April 13, 1990 by 55 FR 14074 April 13, 1990

(E) An understanding of the role of the first responder awareness individual in the employer's emergency response plan including site security and control and the U.S. Department of Transportation's Emergency Response Guidebook.

(F) The ability to realize the need for additional resources and to make appropriate notifications to the communication center.

(ii) *First responder operations level.* First responders at the operations level are individuals who respond to releases or potential releases of hazardous substances as part of the initial response to the site for the purpose of protecting nearby persons, property, or the environment from the effects of the release. They are trained to respond in a defensive fashion without actually trying to stop the release. Their function is to contain the release from a safe distance, keep it from spreading, and prevent exposures. First responders at the operational level shall have received at least eight hours of training or have had sufficient experience to objectively demonstrate competency in the following areas in addition to those listed for the awareness level and the employer shall so certify:

(A) Knowledge of the basic hazard and risk assessment techniques.

(B) Know how to select and use proper personal protective equipment provided to the first responder operational level.

(C) An understanding of basic hazardous materials terms.

(D) Know how to perform basic control, containment and/or confinement operations within the capabilities of the resources and personal protective equipment available with their unit.

(E) Know how to implement basic decontamination procedures.

(F) An understanding of the relevant standard operating procedures and termination procedures.

(iii) *Hazardous materials technician.* Hazardous materials technicians are individuals who respond to releases or potential releases for the purpose of stopping the release. They assume a more aggressive role than a first responder at the operations level in that they will approach the point of release in order to plug, patch or otherwise stop the release of a hazardous substance. Hazardous materials technicians shall have received at least 24 hours of training equal to the first responder operations level and in addition have competency in the following areas and the employer shall so certify:

(A) Know how to implement the employer's emergency response plan.

(B) Know the classification, identification and verification of known and unknown materials by using advanced survey instruments and equipment.

(C) Know of the state emergency response plan.

(D) Be able to select and use proper specialized chemical personal protective equipment provided to the hazardous materials specialist.

(E) Understand in-depth hazard and risk techniques.

(F) Be able to perform specialized control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available.

(G) Be able to determine and implement decontamination procedures.

(H) Have the ability to develop a site safety and control plan.

(I) Understand chemical, radiological and toxicological terminology and behavior.

(v) *On scene incident commander.* Incident commanders, who will assume control of the incident scene beyond the first responder awareness level, shall receive at least 24 hours of training equal to the first responder operations level and in addition have competency in the following areas and the employer shall so certify:

(A) Know and be able to implement the employer's incident command system.

(B) Know how to implement the employer's emergency response plan.

(C) Know how to implement the local emergency response plan.

(D) Understand classification, identification and verification of known and unknown materials by using advanced survey instruments and equipment.

(E) Know of the state emergency response plan.

(F) Be able to select and use proper specialized chemical personal protective equipment provided to the hazardous materials specialist.

(G) Understand in-depth hazard and risk techniques.

(H) Be able to perform specialized control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available with the unit.

(I) Understand and implement decontamination procedures.

(J) Understand termination procedures.

(I) Understand basic chemical and toxicological terminology and behavior.

(iv) *Hazardous materials specialist.* Hazardous materials specialists are individuals who respond with and provide support to hazardous materials technicians. Their duties parallel those of the hazardous materials technician, however, those duties require a more directed or specific knowledge of the various substances they may be called upon to contain. The hazardous materials specialist would also act as the site liaison with Federal, state, local and other government authorities in regards to site activities. Hazardous materials specialists shall have received at least 24 hours of training equal to the technician level and in addition have competency in the following areas and the employer shall so certify:

(A) Know how to implement the local emergency response plan.

(B) Understand classification, identification and verification of known and unknown materials by using advanced survey instruments and equipment.

(C) Know of the state emergency response plan.

(D) Be able to select and use proper specialized chemical personal protective equipment provided to the hazardous materials specialist.

(E) Understand in-depth hazard and risk techniques.

(F) Be able to perform specialized control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available.

(G) Be able to determine and implement decontamination procedures.

(H) Have the ability to develop a site safety and control plan.

(I) Understand chemical, radiological and toxicological terminology and behavior.

(v) *On scene incident commander.* Incident commanders, who will assume control of the incident scene beyond the first responder awareness level, shall receive at least 24 hours of training equal to the first responder operations level and in addition have competency in the following areas and the employer shall so certify:

(A) Know and be able to implement the employer's incident command system.

(B) Know how to implement the employer's emergency response plan.

(C) Know how to implement the local emergency response plan.

(D) Understand classification, identification and verification of known and unknown materials by using advanced survey instruments and equipment.

(E) Know of the state emergency response plan.

(F) Be able to select and use proper specialized chemical personal protective equipment provided to the hazardous materials specialist.

(G) Understand in-depth hazard and risk techniques.

(H) Be able to perform specialized control, containment, and/or confinement operations within the capabilities of the resources and personal protective equipment available with the unit.

(I) Understand and implement decontamination procedures.

(J) Understand termination procedures.

[Sec. 1910.120(q)(6)(v)(B)]

(C) Know and understand the hazards and risks associated with employees working in chemical protective clothing

(D) Know how to implement the local emergency response plan.

(E) Know of the state emergency response plan and of the Federal Regional Response Team.

(F) Know and understand the importance of decontamination procedures.

(7) *Trainers* Trainers who teach any of the above training subjects shall have satisfactorily completed a training course for teaching the subjects they are expected to teach, such as the courses offered by the U.S. National Fire Academy, or they shall have the training and/or academic credentials and instructional experience necessary to demonstrate competent instructional skills and a good command of the subject matter of the courses they are to teach.

[1910 120(q)(7) revised, effective April 13 1990 by 55 FR 14074 April 13 1990]

(8) *Refresher training* (i) Those employees who are trained in accordance with paragraph (q)(6) of this section shall receive annual refresher training of sufficient content and duration to maintain their competencies, or shall demonstrate competency in those areas at least yearly

(ii) A statement shall be made of the training or competency, and if a statement of competency is made, the employer shall keep a record of the methodology used to demonstrate competency

(9) *Medical surveillance and consultation* (i) Members of an organized and designated HAZMAT team and hazardous materials specialists shall receive a baseline physical examination and be provided with medical surveillance as required in paragraph (f) of this section.

(ii) Any emergency response employees who exhibits signs or symptoms which may have resulted from exposure to hazardous substances during the course of an emergency incident, either immediately or subsequently, shall be provided with medical consultation as required in paragraph (f)(3)(ii) of this section

(10) *Chemical protective clothing* Chemical protective clothing and equipment to be used by organized and designated HAZMAT team members, or to be used by hazardous materials specialists shall meet the requirements of

paragraphs (g) (3) through (5) of this section.

(11) *Post-emergency response operations* Upon completion of the emergency response if it is determined that it is necessary to remove hazardous substances, health hazards, and materials contaminated with them (such as contaminated soil or other elements of the natural environment) from the site of the incident, the employer conducting the clean-up shall comply with one of the following:

(i) Meet all of the requirements of paragraphs (b) through (c) of this section, or

(ii) Where the clean-up is done on plant property using plant or workplace employees, such employees shall have completed the training requirements of the following: 29 CFR 1910 38(a), 1910 134, 1910 1200, and other appropriate safety and health training made necessary by the tasks that they are expected to be performed such as personal protective equipment and decontamination procedures. All equipment to be used in the performance of the clean-up work shall be in serviceable condition and shall have been inspected prior to use.

APPENDICES TO § 1910.120—HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE

Note: The following appendices serve as non-mandatory guidelines to assist employees and employers in complying with the appropriate requirements of this section. However paragraph 1910 120(g) makes mandatory in certain circumstances the use of Level A and Level B PPE protection.

APPENDIX A—PERSONAL PROTECTIVE EQUIPMENT TEST METHODS

This appendix sets forth the non-mandatory examples of tests which may be used to evaluate compliance with § 1910 120 (g)(4) (ii) and (iii). Other tests and other challenge agents may be used to evaluate compliance.

A. *Totally-encapsulating chemical protective suit pressure test*

1.0—Scope

1.1 This practice measures the ability of a gas tight totally-encapsulating chemical protective suit material, seams, and closures to maintain a fixed positive pressure. The results of this practice allow the gas tight integrity of a totally-encapsulating chemical protective suit to be evaluated.

1.2 Resistance of the suit materials to permeation, penetration, and degradation by specific hazardous substances is not determined by this test method.

2.0—Definition of terms

2.1 "*Totally-encapsulating chemical protective suit (TECP suit)*" means a full body garment which is constructed of protective clothing materials: covers the wearer's torso head, arms, legs and respirator may cover the wearer's hands and feet with tightly attached gloves and boots, completely encloses the wearer and respirator by itself or in combination with the wearer's gloves and boots.

2.2 "*Protective clothing material*" means any material or combination of materials used in an item of clothing for the purpose of isolating parts of the body from direct contact with a potentially hazardous liquid or gaseous chemicals.

2.3 "*Gas tight*" means, for the purpose of this test method, the limited flow of a gas under pressure from the inside of a TECP suit to atmosphere at a prescribed pressure and time interval.

3.0—Summary of test method

3.1 The TECP suit is visually inspected and modified for the test. The test apparatus is attached to the suit to permit inflation to the pre-test suit expansion pressure for removal of suit wrinkles and creases. The pressure is lowered to the test pressure and monitored for three minutes. If the pressure drop is excessive, the TECP suit fails the test and is removed from service. The test is repeated after leak location and repair

4.0—Required Supplies

4.1 Source of compressed air

4.2 Test apparatus for suit testing, including a pressure measurement device with a sensitivity of at least ¼ inch water gauge

4.3 Vent valve closure plugs or sealing tape

4.4 Soapy water solution and soft brush.

4.5 Stop watch or appropriate timing device.

5.0—Safety Precautions

5.1 Care shall be taken to provide the correct pressure safety devices required for the source of compressed air used.

6.0—Test Procedure

6.1 Prior to each test, the tester shall perform a visual inspection of the suit. Check the suit for seam integrity by visually examining the seams and gently pulling on the seams. Ensure that all air supply lines, fittings, visor zippers, and valves are secure and show no signs of deterioration.

6.1.1 Seal off the vent valves along with any other normal inlet or exhaust points (such as umbilical air line fittings or face piece opening) with tape or other appropriate means (caps, plugs, fixture, etc.). Care should be exercised in the sealing process not to damage any of the suit components.

6.1.2 Close all closure assemblies.

6.1.3 Prepare the suit for inflation by providing an improvised connection point on the suit for connecting an airline. Attach the pressure test apparatus to the suit to permit suit inflation from a compressed air source equipped with a pressure indicating regulator. The leak tightness of the pressure test apparatus should be tested before and after each test by closing off the end of the tubing attached to the suit and assuring a pressure of three inches water gauge for three minutes can be maintained. If a component is removed for the test, that component shall be

[Sec. 1910 120, Appendix A]

replaced and a second test conducted with another component removed to permit a complete test of the ensemble.

6.1.4 The pre-test expansion pressure (A) and the suit test pressure (B) shall be supplied by the suit manufacturer but in no case shall they be less than: (A)—three inches water gauge; and (B)—two inches water gauge. The ending suit pressure (C) shall be no less than 80 percent of the test pressure (B); i.e., the pressure drop shall not exceed 20 percent of the test pressure (B).

6.1.5 Inflate the suit until the pressure inside is equal to pressure (A), the pre-test expansion suit pressure. Allow at least one minute to fill out the wrinkles in the suit. Release sufficient air to reduce the suit pressure to pressure (B), the suit test pressure. Begin timing. At the end of three minutes, record the suit pressure as pressure (C), the ending suit pressure. The difference between the suit test pressure and the ending suit test pressure (B-C) shall be defined as the suit pressure drop.

6.1.6 If the suit pressure drop is more than 20 percent of the suit test pressure (B) during the three-minute test period, the suit fails the test and shall be removed from service.

7.0—Retest Procedure

7.1 If the suit fails the test check for leaks by inflating the suit to pressure (A) and brushing or wiping the entire suit (including seams, closures, lens gaskets, glove-to-sleeve joints, etc.) with a mild soap and water solution. Observe the suit for the formation of soap bubbles, which is an indication of a leak. Repair all identified leaks.

7.2 Retest the TECP suit as outlined in Test procedure 6.0.

8.0—Report

8.1 Each TECP suit tested by this practice shall have the following information recorded.

8.1.1 Unique identification number identifying brand name, date of purchase, material of construction, and unique fit features, e.g., special breathing apparatus.

8.1.2 The actual values for test pressures (A), (B), and (C) shall be recorded along with the specific observation times. If the ending pressure (C) is less than 80 percent of the test pressure (B) the suit shall be identified as failing the test. When possible the specific leak location shall be identified in the test records. Retest pressure data shall be recorded as an additional test.

8.1.3 The source of the test apparatus used shall be identified and the sensitivity of the pressure gauge shall be recorded.

8.1.4 Records shall be kept for each pressure test even if repairs are being made at the test location.

Caution

Visually inspect all parts of the suit to be sure they are positioned correctly and secured tightly before putting the suit back into service. Special care should be taken to examine each exhaust valve to make sure it is not blocked.

Care should also be exercised to assure that the inside and outside of the suit is completely dry before it is put into storage.

B. Totally-encapsulating chemical protective suit qualitative leak test

1.0—Scope

1.1 This practice semi-qualitatively tests gas tight totally-encapsulating chemical protective suit integrity by detecting inward leakage of ammonia vapor. Since no modifications are made to the suit to carry out this test, the results from this practice provide a realistic test for the integrity of the entire suit.

1.2 Resistance of the suit materials to permeation, penetration, and degradation is not determined by this test method. ASTM test methods are available to test suit materials for these characteristics and the tests are usually conducted by the manufacturers of the suits.

2.0—Definition of terms

2.1 "Totally-encapsulated chemical protective suit (TECP suit)" means a full body garment which is constructed of protective clothing materials; covers the wearer's torso, head, arms, legs and respirator may cover the wearer's hands and feet with tightly attached gloves and boots; completely encloses the wearer and respirator by itself or in combination with the wearer's gloves, and boots.

2.2 "Protective clothing material" means any material or combination of materials used in an item of clothing for the purpose of isolating parts of the body from direct contact with a potentially hazardous liquid or gaseous chemicals.

2.3 "Gas tight" means, for the purpose of this test method, the limited flow of a gas under pressure from the inside of a TECP suit to atmosphere at a prescribed pressure and time interval.

2.4 "Intrusion Coefficient" means a number expressing the level of protection provided by a gas tight totally-encapsulating chemical protective suit. The intrusion coefficient is calculated by dividing the test room challenge agent concentration by the concentration of challenge agent found inside the suit. The accuracy of the intrusion coefficient is dependent on the challenge agent monitoring methods. The larger the intrusion coefficient the greater the protection provided by the TECP suit.

3.0—Summary of recommended practice

3.1 The volume of concentrated aqueous ammonia solution (ammonia hydroxide NH_4OH) required to generate the test atmosphere is determined using the directions outlined in 6.1. The suit is donned by a person wearing the appropriate respiratory equipment (either a positive pressure self-contained breathing apparatus or a positive pressure supplied air respirator) and worn inside the enclosed test room. The concentrated aqueous ammonia solution is taken by the suited individual into the test room and poured into an open plastic pan. A two-minute evaporation period is observed before the test room concentration is measured, using a high range ammonia length of stain detector tube. When the ammonia vapor reaches a concentration of between 1000 and 1200 ppm, the suited individual starts a standardized exercise protocol to stress and flex the suit. After this protocol is completed, the test room concentration is measured again. The suited

individual exits the test room and his stand-by person measures the ammonia concentration inside the suit using a low range ammonia length of stain detector tube or other more sensitive ammonia detector. A stand-by person is required to observe the test individual during the test procedure; aid the person in donning and doffing the TECP suit, and monitor the suit interior. The intrusion coefficient of the suit can be calculated by dividing the average test area concentration by the interior suit concentration. A colorimetric ammonia indicator strip of bromophenol blue or equivalent is placed on the inside of the suit face piece lens so that the suited individual is able to detect a color change and know if the suit has a significant leak. If a color change is observed the individual shall leave the test room immediately.

4.0—Required supplies

4.1 A supply of concentrated aqueous ammonium hydroxide (58 percent by weight)

[1910.120, Appendix A(B 4.1) revised, effective April 13 1990, by 55 FR 14074, April 13 1990]

4.2 A supply of bromophenol/blue indicating paper or equivalent, sensitive to 5-10 ppm ammonia or greater over a two-minute period of exposure. (pH 3.0 (yellow) to pH 4.6 (blue))

4.3 A supply of high range (0.5-10 volume percent) and low range (5-700 ppm) detector tubes for ammonia and the corresponding sampling pump. More sensitive ammonia detectors can be substituted for the low range detector tubes to improve the sensitivity of this practice.

4.4 A shallow plastic pan (PVC) at least 12" 14" 1" and a half pint plastic container (PVC) with tightly closing lid.

4.5 A graduated cylinder or other volumetric measuring device of at least 50 milliliters in volume with an accuracy of at least ± 1 milliliters.

5.0—Safety precautions

5.1 Concentrated aqueous ammonium hydroxide, NH_4OH , is a corrosive volatile liquid requiring eye, skin, and respiratory protection. The person conducting the test shall review the MSDS for aqueous ammonia.

5.2 Since the established permissible exposure limit for ammonia is 35 ppm as a 15 minute STEL, only persons wearing a positive pressure self-contained breathing apparatus or a positive pressure supplied air respirator shall be in the chamber. Normally only the person wearing the totally-encapsulating suit will be inside the chamber. A stand-by person shall have a positive pressure self-contained breathing apparatus, or a positive pressure supplied air respirator available to enter the test area should the suited individual need assistance.

[1910.120, Appendix A(B 5.2) revised effective April 13 1990 by 55 FR 14074 April 13, 1990]

5.3 A method to monitor the suited individual must be used during this test. Visual contact is the simplest but other methods using communication devices are acceptable.

5.4 The test room shall be large enough to allow the exercise protocol to be carried out and then to be ventilated to allow for easy

[Sec. 1910.120, Appendix A]

exhaust of the ammonia test atmosphere after the test(s) are completed.

5.5 Individuals shall be medically screened for the use of respiratory protection and checked for allergies to ammonia before participating in this test procedure.

6.0—Test procedure

6.1.1 Measure the test area to the nearest foot and calculate its volume in cubic feet. Multiply the test area volume by 0.2 milliliters of concentrated aqueous ammonia solution per cubic foot of test area volume to determine the approximate volume of concentrated aqueous ammonia required to generate 1000 ppm in the test area.

6.1.2 Measure this volume from the supply of concentrated aqueous ammonia and place it into a closed plastic container.

6.1.3 Place the container several high range ammonia detector tubes, and the pump in the clean test pan and locate it near the test area entry door so that the suited individual has easy access to these supplies.

6.2.1 In a non-contaminated atmosphere open a pre-sealed ammonia indicator strip and fasten one end of the strip to the inside of the suit face shield lens where it can be seen by the wearer. Moisten the indicator strip with distilled water. Care shall be taken not to contaminate the detector part of the indicator paper by touching it. A small piece of masking tape or equivalent should be used to attach the indicator strip to the interior of the suit face shield.

6.2.2 If problems are encountered with this method of attachment, the indicator strip can be attached to the outside of the respirator face piece lens being used during the test.

6.3 Don the respiratory protective device normally used with the suit, and then don the TECP suit to be tested. Check to be sure all openings which are intended to be sealed (zippers, gloves, etc.) are completely sealed. DO NOT however plug off any venting valves.

6.4 Step into the enclosed test room such as a closet, bathroom or test booth, equipped with an exhaust fan. No air should be exhausted from the chamber during the test because this will dilute the ammonia challenge concentrations.

6.5 Open the container with the pre-measured volume of concentrated aqueous ammonia within the enclosed test room, and pour the liquid into the empty plastic test pan. Wait two minutes to allow for adequate volatilization of the concentrated aqueous ammonia. A small mixing fan can be used near the evaporation pan to increase the evaporation rate of the ammonia solution.

6.6 After two minutes a determination of the ammonia concentration within the chamber should be made using the high range colorimetric detector tube. A concentration of 1000 ppm ammonia or greater shall be generated before the exercises are started.

6.7 To test the integrity of the suit the following four minute exercise protocol should be followed.

6.7.1 Raising the arms above the head with at least 15 raising motions completed in one minute.

6.7.2 Walking in place for one minute with at least 15 raising motions of each leg in a one-minute period.

6.7.3 Touching the toes with a least 10 complete motions of the arms from above the head to touching of the toes in a one-minute period.

6.7.4 Knee bends with at least 10 complete standing and squatting motions in a one-minute period.

6.8 If at any time during the test the colorimetric indicating paper should change colors, the test should be stopped and section 6.10 and 6.12 initiated (See Para. 4.2).

6.9 After completion of the test exercise, the test area concentration should be measured again using the high range colorimetric detector tube.

6.10 Exit the test area.

6.11 The opening created by the suit zipper or other appropriate suit penetration should be used to determine the ammonia concentration in the suit with the low range length of stain detector tube or other ammonia monitor. The internal TECP suit air should be sampled far enough from the enclosed test area to prevent a false ammonia reading.

6.12 After completion of the measurement of the suit interior ammonia concentration the test is concluded and the suit is doffed and the respirator removed.

6.13 The ventilating fan for the test room should be turned on and allowed to run for enough time to remove the ammonia gas. The fan shall be vented to the outside of the building.

6.14 Any detectable ammonia in the suit interior (five ppm ammonia (NH₃) or more for the length of stain detector tube) indicates that the suit has failed the test. When other ammonia detectors are used a lower level of detection is possible, and it should be specified as the pass/fail criteria.

6.15 By following this test method, an intrusion coefficient of approximately 200 or more can be measured with the suit in a completely operational condition. If the intrusion coefficient is 200 or more, then the suit is suitable for emergency response and field use.

7.0—Retest procedures

7.1 If the suit fails this test, check for leaks by following the pressure test in test A above.

7.2 Retest the TECP suit as outlined in the test procedure 6.0.

8.0—Report

8.1 Each gas tight totally-encapsulating chemical protective suit tested by this practice shall have the following information recorded.

8.1.1 Unique identification number identifying brand name, date of purchase, material of construction, and unique suit features, e.g. special breathing apparatus.

8.1.2 General description of test room used for test.

8.1.3 Brand name and purchase date of ammonia detector strips and color change data.

8.1.4 Brand name, sampling range, and expiration date of the length of stain ammonia detector tubes. The brand name and model of

the sampling pump should also be recorded. If another type of ammonia detector is used, it should be identified along with its minimum detection limit for ammonia.

8.1.5 Actual test results shall list the two test area concentrations, their average the interior suit concentration, and the calculated intrusion coefficient. Retest data shall be recorded as an additional test.

8.2 The evaluation of the data shall be specified as "suit passed" or "suit failed," and the date of the test. Any detectable ammonia (five ppm or greater for the length of stain detector tube) in the suit interior indicates the suit has failed this test. When other ammonia detectors are used, a lower level of detection is possible and it should be specified as the pass fail criteria.

Castles

Visually inspect all parts of the suit to be sure they are positioned correctly and secured tightly before putting the suit back into service. Special care should be taken to examine each exhaust valve to make sure it is not blocked.

Care should also be exercised to assure that the inside and outside of the suit is completely dry before it is put into storage.

APPENDIX B—GENERAL DESCRIPTION AND DISCUSSION OF THE LEVELS OF PROTECTION AND PROTECTIVE GEAR

This appendix sets forth information about personal protective equipment (PPE) protection levels which may be used to assist employers in complying with the PPE requirements of this section.

As required by the standard, PPE must be selected which will protect employees from the specific hazards which they are likely to encounter during their work on-site.

Selection of the appropriate PPE is a complex process which should take into consideration a variety of factors. Key factors involved in this process are identification of the hazards, or suspected hazards; their routes of potential hazard to employees (inhalation, skin absorption, ingestion, and eye or skin contact); and the performance of the PPE materials (and seams) in providing a barrier to these hazards. The amount of protection provided by PPE is material-hazard specific. That is, protective equipment materials will protect well against some hazardous substances and poorly, or not at all, against others. In many instances, protective equipment materials cannot be found which will provide continuous protection from the particular hazardous substance. In these cases the breakthrough time of the protective material should exceed the work durations.

[1910.120 Appendix B corrected, effective April 13 1990, by 55 FR 14074 April 13, 1990]

Other factors in this selection process to be considered are matching the PPE to the employee's work requirements and task-specific conditions. The durability of PPE materials, such as tear strength and seam strength, should be considered in relation to the employee's tasks. The effects of PPE in relation to heat stress and task duration are a factor

[Sec. 1910.120, Appendix B]

in selecting and using PPE. In some cases layers of PPE may be necessary to provide sufficient protection, or to protect expensive PPE inner garments, suits or equipment.

The more that is known about the hazards at the site, the easier the job of PPE selection becomes. As more information about the hazards and conditions at the site becomes available, the site supervisor can make decisions to up-grade or down-grade the level of PPE protection to match the tasks at hand.

The following are guidelines which an employer can use to begin the selection of the appropriate PPE. As noted above, the site information may suggest the use of combinations of PPE selected from the different protection levels (i.e., A, B, C, or D) as being more suitable to the hazards of the work. It should be cautioned that the listing below does not fully address the performance of the specific PPE material in relation to the specific hazards at the job site, and that PPE selection, evaluation and re-selection is an ongoing process until sufficient information about the hazards and PPE performance is obtained.

Part A. Personal protective equipment is divided into four categories based on the degree of protection afforded. (See Part B of this appendix for further explanation of Levels A, B, C, and D hazards.)

I. Level A—To be selected when the greatest level of skin, respiratory, and eye protection is required.

The following constitute Level A equipment; it may be used as appropriate:

1 Positive pressure, full face-piece self-contained breathing apparatus (SCBA), or positive pressure supplied air respirator with escape SCBA, approved by the National Institute for Occupational Safety and Health (NIOSH)

2. Totally-encapsulating chemical-protective suit.

3 Coveralls.¹

4 Long underwear¹

5 Gloves, outer chemical-resistant.

6 Gloves, inner chemical-resistant.

7 Boots, chemical-resistant, steel toe and shank.

8 Hard hat (under suit)¹

9 Disposable protective suit, gloves and boots (depending on suit construction, may be worn over totally-encapsulating suit)

II. Level B—The highest level of respiratory protection is necessary but a lesser level of skin protection is needed.

The following constitute Level B equipment; it may be used as appropriate:

1 Positive pressure full-facepiece self-contained breathing apparatus (SCBA) or positive pressure supplied air respirator with escape SCBA (NIOSH approved).

2 Hooded chemical-resistant clothing (coveralls and long-sleeved jacket; coveralls, one or two-piece chemical-splash suit; disposable chemical-resistant overalls)

3 Coveralls.¹

4 Gloves, outer chemical-resistant.

¹ Optional, as applicable

5 Gloves, inner chemical-resistant.

6 Boots, outer chemical-resistant steel toe and shank.

7 Boot-covers, outer chemical-resistant (disposable)¹

8 Hard hat.¹

9 [Reserved]

10 Face shield.¹

III. Level C—The concentration(s) and type(s) of airborne substance(s) is known and the criteria for using air purifying respirators are met.

The following constitute Level C equipment; it may be used as appropriate:

1 Full-face or half-mask, air purifying respirators (NIOSH approved).

2 Hooded chemical-resistant clothing (overall; two-piece chemical-splash suit; disposable chemical-resistant overalls).

3 Coveralls.¹

4 Gloves, outer, chemical-resistant.

5 Gloves, inner chemical-resistant.

6 Boots (outer), chemical-resistant steel toe and shank.¹

7 Boot-covers, outer, chemical-resistant (disposable)¹

8 Hard hat.¹

9 Escape mask.¹

10 Face shield.¹

IV. Level D—A work uniform affording minimal protection, used for nuisance contamination only

The following constitute Level D equipment; it may be used as appropriate:

1 Coveralls.

2 Gloves.¹

3 Boots/shoes, chemical-resistant steel toe and shank.

4 Boots, outer chemical-resistant (disposable)¹

5 Safety glasses or chemical splash goggles¹

6 Hard hat.¹

7 Escape mask.¹

8 Face shield.¹

Part B. The types of hazards for which levels A, B, C, and D protection are appropriate are described below:

I. Level A—Level A protection should be used when:

1 The hazardous substance has been identified and requires the highest level of protection for skin, eyes, and the respiratory system based on either the measured (or potential for) high concentration of atmospheric vapors, gases, or particulates; or the site operations and work functions involve a high potential for splash, immersion, or exposure to unexpected vapors, gases, or particulates of materials that are harmful to skin or capable of being absorbed through the skin.

2 Substances with a high degree of hazard to the skin are known or suspected to be present, and skin contact is possible; or

3 Operations are being conducted in confined, poorly ventilated areas, and the absence of conditions requiring Level A have not yet been determined.

II. Level B—Level B protection should be used when:

1 The type and atmospheric concentration of substances have been identified and require a high level of respiratory protection, but less skin protection.

2 The atmosphere contains less than 19.5 percent oxygen, or

3 The presence of incompletely identified vapors or gases is indicated by a direct-reading organic vapor detection instrument, but vapors and gases are not suspected of containing high levels of chemicals harmful to skin or capable of being absorbed through the skin.

Note: This involves atmospheres with IDLH concentrations of specific substances that present severe inhalation hazards and that do not represent a severe skin hazard; or that do not meet the criteria for use of air-purifying respirators.

III. Level C—Level C protection should be used when:

1 The atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect or be absorbed through any exposed skin.

2 The types of air contaminants have been identified, concentrations measured, and an air-purifying respirator is available that can remove the contaminants; and

3 All criteria for the use of air-purifying respirators are met.

IV. Level D—Level D protection should be used when:

1 The atmosphere contains no known hazard; and

2 Work functions preclude splashes, immersion, or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals.

Note: As stated before, combinations of personal protective equipment other than those described for Levels A, B, C and D protection may be more appropriate and may be used to provide the proper level of protection.

As an aid in selecting suitable chemical protective clothing, it should be noted that the National Fire Protection Association is developing standards on chemical protective clothing. These standards are currently undergoing public review prior to adoption, including:

NFPA 1991—Standard on Vapor-Protective Suits for Hazardous Chemical Emergencies (EPA Level A Protective Clothing)

NFPA 1992—Standard on Liquid Splash-Protective Suits for Hazardous Chemical Emergencies (EPA Level B Protective Clothing)

NFPA 1993—Standard on Liquid Splash-Protective Suits for Non-emergency, Non-flammable Hazardous Chemical Situations (EPA Level B Protective Clothing)

[1910.120, Appendix B, Part B, Level D revised, effective April 13 1990 by 55 FR 14074 April 13, 1990]

[Sec. 1910.120, Appendix B]

These standards would apply documentation and performance requirements to the manufacture of chemical protective suits. Chemical protective suits meeting these requirements would be labeled as compliant with the appropriate standard. When these standards are adopted by the National Fire Protection Association, it is recommended that chemical protective suits which meet these standards be used.

APPENDIX C—COMPLIANCE GUIDELINES

1. *Occupational Safety and Health Program.* Each hazardous waste site clean-up effort will require an occupational safety and health program headed by the site coordinator or the employer's representative. The purpose of the program will be the protection of employees at the site and will be an extension of the employer's overall safety and health program. The program will need to be developed before work begins on the site and implemented as work proceeds as stated in paragraph (b). The program is to facilitate coordination and communication of safety and health issues among personnel responsible for the various activities which will take place at the site. It will provide the overall means for planning and implementing the needed safety and health training and job orientation of employees who will be working at the site. The program will provide the means for identifying and controlling work-site hazards and the means for monitoring program effectiveness. The program will need to cover the responsibilities and authority of the site coordinator or the employer's manager on the site for the safety and health of employees at the site, and the relationships with contractors or support services as to what each employer's safety and health responsibilities are for their employees on the site. Each contractor on the site needs to have its own safety and health program so structured that it will smoothly interface with the program of the site coordinator or principal contractor.

Also those employers involved with treating, storing or disposal of hazardous waste as covered in paragraph (p) must have implemented a safety and health program for their employees. This program is to include the hazard communication program required in paragraph (p)(1) and the training required in paragraphs (p)(7) and (p)(8) as parts of the employers comprehensive overall safety and health program. This program is to be in writing.

Each site or workplace safety and health program will need to include the following: (1) Policy statements of the line of authority and accountability for implementing the program, the objectives of the program and the role of the site safety and health supervisor or manager and staff; (2) means or methods for the development of procedures for identifying and controlling workplace hazards at the site; (3) means or methods for the development and communication to employees of the various plans, work rules, standard operating procedures and practices that pertain to individual employees and supervisors; (4) means for the training of supervisors and employees to develop the needed skills and knowledge to perform their work in a safe

and healthful manner; (5) means to anticipate and prepare for emergency situations; and (6) means for obtaining information feedback to aid in evaluating the program and for improving the effectiveness of the program. The management and employees should be trying continually to improve the effectiveness of the program thereby enhancing the protection being afforded those working on the site.

Accidents on the site or workplace should be investigated to provide information on how such occurrences can be avoided in the future. When injuries or illnesses occur on the site or workplace, they will need to be investigated to determine what needs to be done to prevent this incident from occurring again. Such information will need to be used as feedback on the effectiveness of the program and the information turned into positive steps to prevent any recurrence. Receipt of employee suggestions or complaints relating to safety and health issues involved with site or workplace activities is also a feedback mechanism that can be used effectively to improve the program and may serve in part as an evaluative tool(s).

For the development and implementation of the program to be the most effective, professional safety and health personnel should be used. Certified Safety Professionals, Board Certified Industrial Hygienists or Registered Professional Safety Engineers are good examples of professional stature for safety and health managers who will administer the employer's program.

2. *Training.* The training programs for employees subject to the requirements of paragraph (e) of this standard should address: the safety and health hazards employees should expect to find on hazardous waste clean-up sites, what control measures or techniques are effective for those hazards; what monitoring procedures are effective in characterizing exposure levels; what makes an effective employer's safety and health program, what a site safety and health plan should include; hands on training with personal protective equipment and clothing they may be expected to use; the contents of the OSHA standard relevant to the employee's duties and function, and, employee's responsibilities under OSHA and other regulations. Supervisors will need training in their responsibilities under the safety and health program and its subject areas such as the spill containment program, the personal protective equipment program, the medical surveillance program, the emergency response plan and other areas.

The training programs for employees subject to the requirements of paragraph (p) of this standard should address: the employers safety and health program elements impacting employees, the hazard communication program, the medical surveillance program, the hazards and the controls for such hazards that employees need to know for their job duties and functions. All require annual refresher training.

The training programs for employees covered by the requirements of paragraph (q) of this standard should address those competencies required for the various levels of response such as, the hazards associated with hazardous substances; hazard identification and awareness; notification of appropriate

persons; the need for and use of personal protective equipment including respirators; the decontamination procedures to be used, preplanning activities for hazardous substance incidents including the emergency response plan, company standard operating procedures for hazardous substance emergency responses; the use of the incident command system and other subjects. Hands-on training should be stressed whenever possible. Critiques done after an incident which include an evaluation of what worked and what did not and how could the incident be better handled the next time may be counted as training time.

For hazardous materials specialists (usually members of hazardous materials teams), the training should address the care, use and/or testing of chemical protective clothing including totally encapsulating suits, the medical surveillance program, the standard operating procedures for the hazardous materials team including the use of plugging and patching equipment and other subject areas.

Officers and leaders who may be expected to be in charge at an incident should be fully knowledgeable of their company's incident command system. They should know where and how to obtain additional assistance and be familiar with the local district's emergency response plan and the state emergency response plan.

Specialist employees such as technical experts, medical experts or environmental experts that work with hazardous materials in their regular jobs, who may be sent to the incident scene by the shipper, manufacturer or governmental agency to advise and assist the person in charge of the incident should have training on an annual basis. Their training should include the care and use of personal protective equipment including respirators; knowledge of the incident command system and how they are to relate to it; and those areas needed to keep them current in their respective field as it relates to safety and health involving specific hazardous substances.

Those skilled support personnel, such as employees who work for public works departments or equipment operators who operate bulldozers, sand trucks, backhoes, etc., who may be called to the incident scene to provide emergency support assistance, should have at least a safety and health briefing before entering the area of potential or actual exposure. These skilled support personnel, who have not been a part of the emergency response plan and do not meet the training requirements, should be made aware of the hazards they face and should be provided all necessary protective clothing and equipment required for their tasks.

There are two National Fire Protection Association standards, NFPA 472—“Standard for Professional Competence of Responders to Hazardous Material Incidents” and NFPA 471—“Recommended Practice for Responding to Hazardous Material Incidents”, which are excellent resource documents to aid fire departments and other emergency response organizations in developing their training program materials. NFPA 472 provides guidance on the skills and knowledge needed for first responder awareness level, first respond-

er operations level, hazmat technicians, and hazmat specialist. It also offers guidance for the officer corp who will be in charge of hazardous substance incidents.

[1910 120 Appendix C Section 2, paragraph added effective April 13 1990, by 55 FR 14074 April 13 1990]

3 *Decontamination.* Decontamination procedures should be tailored to the specific hazards of the site, and may vary in complexity and number of steps, depending on the level of hazard and the employee's exposure to the hazard. Decontamination procedures and PPE decontamination methods will vary depending upon the specific substance, since one procedure or method may not work for all substances. Evaluation of decontamination methods and procedures should be performed, as necessary to assure that employees are not exposed to hazards by re-using PPE. References in Appendix D may be used for guidance in establishing an effective decontamination program. In addition, the U.S. Coast Guard's Manual, "Policy Guidance for Response to Hazardous Chemical Releases," U.S. Department of Transportation, Washington, DC (COMDTINST M16465.30) is a good reference for establishing an effective decontamination program.

[1910 120 Appendix C Section 3 revised effective April 13 1990 by 55 FR 14074 April 13 1990]

4 *Emergency response plans.* States, along with designated districts within the states, will be developing or have developed local emergency response plans. These state and district plans should be utilized in the emergency response plans called for in the standard. Each employer should assure that its emergency response plan is compatible with the local plan. The major reference being used to aid in developing the state and local district plans is the *Hazardous Materials Emergency Planning Guide NRT-1*. The current Emergency Response Guidebook from the U.S. Department of Transportation, CMAA's CHEMTREC and the Fire Service Emergency Management Handbook may also be used as resources.

Employers involved with treatment, storage and disposal facilities for hazardous waste which have the required contingency plan called for by their permit, would not need to duplicate the same planning elements. Those items of the emergency response plan that are properly addressed in the contingency plan may be substituted into the emergency response plan required in 1910 120 or otherwise kept together for employer and employee use.

5 *Personal protective equipment programs.* The purpose of personal protective clothing and equipment (PPE) is to shield or isolate individuals from the chemical, physical, and biologic hazards that may be encountered at a hazardous substance site.

As discussed in Appendix B, no single combination of protective equipment and clothing is capable of protecting against all hazards. Thus PPE should be used in conjunction with other protective methods and its effectiveness evaluated periodically.

The use of PPE can itself create significant worker hazards, such as heat stress, physical and psychological stress, and impaired vision,

mobility, and communication. For any given situation, equipment and clothing should be selected that provide an adequate level of protection. However over-protection, as well as under-protection, can be hazardous and should be avoided where possible.

Two basic objectives of any PPE program should be to protect the wearer from safety and health hazards, and to prevent injury to the wearer from incorrect use and/or malfunction of the PPE. To accomplish these goals, a comprehensive PPE program should include hazard identification, medical monitoring, environmental surveillance, selection, use, maintenance, and decontamination of PPE and its associated training.

The written PPE program should include policy statements, procedures, and guidelines. Copies should be made available to all employees, and a reference copy should be made available at the worksite. Technical data on equipment, maintenance manuals, relevant regulations, and other essential information should also be collected and maintained.

6 *Incident command system (ICS).* Paragraph 1910 120(q)(3)(ii) requires the implementation of an ICS. The ICS is an organized approach to effectively control and manage operations at an emergency incident. The individual in charge of the ICS is the senior official responding to the incident. The ICS is not much different than the "command post" approach used for many years by the fire service. During large complex fires involving several companies and many pieces of apparatus, a command post would be established. This enabled one individual to be in charge of managing the incident, rather than having several officers from different companies making separate, and sometimes conflicting decisions. The individual in charge of the command post would delegate responsibility for performing various tasks to subordinate officers. Additionally, all communications were routed through the command post to reduce the number of radio transmissions and eliminate confusion. However strategy, tactics, and all decisions were made by one individual.

The ICS is a very similar system, except it is implemented for emergency response to all incidents, both large and small, that involve hazardous substances.

For a small incident, the individual in charge of the ICS may perform many tasks of the ICS. There may not be any, or little, delegation of tasks to subordinates. For example, in response to a small incident, the individual in charge of the ICS, in addition to normal command activities, may become the safety officer and may designate only one employee (with proper equipment) as a back-up to provide assistance if needed. OSHA does recommend, however, that at least two employees be designated as back-up personnel since the assistance needed may include rescue.

To illustrate the operation of the ICS the following scenario might develop during a small incident, such as an overturned tank truck with a small leak of flammable liquid.

The first responding senior officer would implement and take command of the ICS. That person would size-up the incident and

determine if additional personnel and apparatus were necessary, would determine what actions to take to control the leak, and determine the proper level of personal protective equipment. If additional assistance is not needed, the individual in charge of the ICS would implement actions to stop and control the leak using the fewest number of personnel that can effectively accomplish the tasks. The individual in charge of the ICS then would designate himself as the safety officer and two other employees as a back-up in case rescue may become necessary. In this scenario, decontamination procedures would not be necessary.

A large complex incident may require many employees and difficult, time-consuming efforts to control. In these situations, the individual in charge of the ICS will want to delegate different tasks to subordinates in order to maintain a span of control that will keep the number of subordinates, that are reporting, to a manageable level.

Delegation of task at large incidents may be by location, where the incident scene is divided into sectors, and subordinate officers coordinate activities within the sector that they have been assigned.

Delegation of tasks can also be by function. Some of the functions that the individual in charge of the ICS may want to delegate at a large incident are: medical services, evacuation, water supply resources (equipment, apparatus), media relations, safety and site control (integrate activities with police for crowd and traffic control). Also for a large incident, the individual in charge of the ICS will designate several employees as back-up personnel, and a number of safety officers to monitor conditions and recommend safety precautions.

Therefore, no matter what size or complexity an incident may be, by implementing an ICS there will be one individual in charge who makes the decisions and gives directions, and, all actions, and communications are coordinated through one central point of command. Such a system should reduce confusion, improve safety, organize and coordinate actions, and should facilitate effective management of the incident.

7 *Site Safety and Control Plans.* The safety and security of response personnel and others in the area of an emergency response incident site should be of primary concern to the incident commander. The use of a site safety and control plan could greatly assist those in charge of assuring the safety and health of employees on the site.

A comprehensive site safety and control plan should include the following: summary analysis of hazards on the site and a risk analysis of those hazards; site map or sketch, site work zones (clean zone, transition or decontamination zone, work or hot zone), use of the buddy system, site communications; command post or command center standard operating procedures and safe work practices; medical assistance and triage area, hazard monitoring plan (air contaminate monitoring, etc.); decontamination procedures and area, and other relevant areas. This plan should be a part of the employer's emergency response plan or an extension of it to the specific site.

[Sec. 1910 120, Appendix C]

8. *Medical surveillance programs.* Workers handling hazardous substances may be exposed to toxic chemicals, safety hazards, biologic hazards, and radiation. Therefore, a medical surveillance program is essential to assess and monitor workers' health and fitness for employment in hazardous waste operations and during the course of work; to provide emergency and other treatment as needed, and to keep accurate records for future reference.

The *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities* developed by the National Institute for Occupational Safety and Health (NIOSH), the Occupational Safety and Health Administration (OSHA), the U.S. Coast Guard (USCG), and the Environmental Protection Agency (EPA); October 1985 provides an excellent example of the types of medical testing that should be done as part of a medical surveillance program.

9. *New Technology and Spill Containment Programs.* Where hazardous substances may be released by spilling from a container that will expose employees to the hazards of the materials, the employer will need to implement a program to contain and control the spilled material. Diking and ditching, as well as use of absorbents like diatomaceous earth, are traditional techniques which have proven to be effective over the years. However in recent years new products have come into the marketplace, the use of which complement and increase the effectiveness of these traditional methods. These new products also provide emergency responders and others with additional tools or agents to use to reduce the hazards of spilled materials.

These agents can be rapidly applied over a large area and can be uniformly applied or otherwise can be used to build a small dam, thus improving the workers' ability to control spilled material. These application techniques enhance the intimate contact between the agent and the spilled material allowing for the quickest effect by the agent or quickest control of the spilled material. Agents are available to solidify liquid spilled materials, to suppress vapor generation from spilled materials, and to do both. Some special agents, which when applied as recommended by the manufacturer will react in a controlled manner with the spilled material to neutralize acids or caustics, or greatly reduce the level of hazard of the spilled material.

There are several modern methods and devices for use by emergency response personnel or others involved with spill control efforts to safely apply spill control agents to control spilled material hazards. These include portable pressurized applicators similar to hand-held portable fire extinguishing devices, and nozzle and hose systems similar to portable fire fighting foam systems which allow the operator to apply the agent without having to come into contact with the spilled material. The operator is able to apply the agent to the spilled material from a remote position.

The solidification of liquids provides for rapid containment and isolation of hazardous substance spills. By directing the agent at run-off points or at the edges of the spill, the reactant solid will automatically create a barrier to slow or stop the spread of the mate-

rial. Clean-up of hazardous substances is greatly improved when solidifying agents, acid or caustic neutralizers, or activated carbon adsorbents are used. Properly applied, these agents can totally solidify liquid hazardous substances or neutralize or absorb them, which results in materials which are less hazardous and easier to handle, transport, and dispose of. The concept of spill treatment, to create less hazardous substances, will improve the safety and level of protection of employees working at spill clean-up operations or emergency response operations to spills of hazardous substances.

The use of vapor suppression agents for volatile hazardous substances, such as flammable liquids and those substances which present an inhalation hazard, is important for protecting workers. The rapid and uniform distribution of the agent over the surface of the spilled material can provide quick vapor knockdown. There are temporary and long-term foam-type agents which are effective on vapors and dusts, and activated carbon adsorption agents which are effective for vapor control and soaking-up of the liquid. The proper use of hose lines or hand-held portable pressurized applicators provides good mobility and permits the worker to deliver the agent from a safe distance without having to step into the untreated spilled material. Some of these systems can be recharged in the field to provide coverage of larger spill areas than the design limits of a single charged applicator unit. Some of the more effective agents can solidify the liquid flammable hazardous substances and at the same time elevate the flashpoint above 140 deg. F so the resulting substance may be handled as a nonhazardous waste material if it meets the U.S. Environmental Protection Agency's 40 CFR part 261 requirements (See particularly § 261.21).

All workers performing hazardous substance spill control work are expected to wear the proper protective clothing and equipment for the materials present and to follow the employer's established standard operating procedures for spill control. All involved workers need to be trained in the established operating procedures; in the use and care of spill control equipment; and in the associated hazards and control of such hazards of spill containment work.

These new tools and agents are the things that employers will want to evaluate as part of their new technology program. The treatment of spills of hazardous substances or wastes at an emergency incident as part of the immediate spill containment and control efforts is sometimes acceptable to EPA and a permit exception is described in 40 CFR 264.1(g)(8) and 265.1(c)(11).

[Sec. 1910.120, Appendix C, Section 9 added effective April 13, 1990 by 55 FR 14074, April 13, 1990]

APPENDIX D—REFERENCES.

The following references may be consulted for further information on the subject of this standard:

1. OSHA Instruction DFO CPL 2.70—January 29 1986 *Special Emphasis Program. Hazardous Waste Sites.*

2. OSHA Instruction DFO CPL 2-2.37A—January 29 1986. *Technical Assistance and Guidelines for Superfund and Other Hazardous Waste Site Activities.*

3. OSHA Instruction DTS CPL 2.74—January 29 1986. *Hazardous Waste Activity Form, OSHA 175*

4. *Hazardous Waste Inspections Reference Manual.* U.S. Department of Labor, Occupational Safety and Health Administration, 1986.

5. *Memorandum of Understanding Among the National Institute for Occupational Safety and Health, the Occupational Safety and Health Administration, the United States Coast Guard, and the United States Environmental Protection Agency, Guidance for Worker Protection During Hazardous Waste Site Investigations and Clean-up and Hazardous Substance Emergencies.* December 18, 1980.

6. *National Priorities List, 1st Edition.* October 1984. U.S. Environmental Protection Agency, Revised periodically

7. *The Decontamination of Response Personnel, Field Standard Operating Procedures (F.S.O.P.)* ? U.S. Environmental Protection Agency Office of Emergency and Remedial Response, Hazardous Response Support Division, December 1984.

8. *Preparation of a Site Safety Plan, Field Standard Operating Procedures (F.S.O.P.)* ? U.S. Environmental Protection Agency Office of Emergency and Remedial Response, Hazardous Response Support Division, April 1985.

9. *Standard Operating Safety Guidelines* U.S. Environmental Protection Agency, Office of Emergency and Remedial Response, Hazardous Response Support Division, Environmental Response Team, November 1984

10. *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities* National Institute for Occupational Safety and Health (NIOSH), Occupational Safety and Health Administration (OSHA), U.S. Coast Guard (USCG), and Environmental Protection Agency (EPA), October 1985

11. *Protecting Health and Safety at Hazardous Waste Sites: An Overview,* U.S. Environmental Protection Agency EPA/625/9-85/006 September 1985

12. *Hazardous Waste Sites and Hazardous Substance Emergencies* NIOSH Worker Bulletin, U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health, December 1982.

13. *Personal Protective Equipment for Hazardous Materials Incidents: A Selection Guide,* U.S. Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health, October 1984

14. *Fire Service Emergency Management Handbook,* International Association of Fire Chiefs Foundation, 101 East Holly Avenue Unit 10B, Sterling VA 22170, January 1985

15. *Emergency Response Guidebook,* U.S. Department of Transportation, Washington, DC 1987

[Sec. 1910.120, Appendix C]

16 *Report to the Congress on Hazardous Materials Training, Planning and Preparedness* Federal Emergency Management Agency Washington, DC, July 1986.

17 *Workbook for Fire Command*, Alan V Brunacini and J David Beagerson, National Fire Protection Association, Batterymarch Park, Quincy, MA 02269 1985

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[1910.120, Appendix D, Section 18 revised, effective April 13, 1990, by 55 FR 14074, April 13 1990]

19 *Incident Command System*, Fire Protection Publications, Oklahoma State University, Stillwater, OK 74078, 1983.

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21 *Hazardous Materials Emergency Planning Guide*, NRT-1, Environmental Protection Agency, Washington, DC, March 1987

22 *Community Teamwork: Working Together to Promote Hazardous Materials Transportation Safety*, U.S. Department of Transportation, Washington, DC May 1983.

23 *Disaster Planning Guide for Business and Industry*, Federal Emergency Management Agency, Publication No FEMA 141, August 1987

(The Office of Management and Budget has approved the information collection requirements in this section under control number 1218-0319)

[Sec. 1910.120, Appendix D]

APPENDIX II

**FEDERAL FACILITIES AGREEMENT
AND CONSENT ORDER**

INTER-AGENCY AGREEMENT

TABLE 5 - PRELIMINARY RFI/RF WORKPLANS

TABLE 6 - MILESTONE SCHEDULE

Table 5 Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

Operable Unit 1-881 Hillside

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
102	Oil Sludge Pit	1. Continue with 881 Hillside RFI/RI CMS/FS process in progress	1 Submit an RFI/RI workplan in accordance with section VI of the Statement of Work Submit a revised 881 RI/FS
103	Chemical Burial		
104	Liquid Dumping		
105 1	Western Most Out-of-Service Fuel Tank	--	--- (RFI/CMS) in accordance with the schedules within Table 6 of the SOW The revised RI/FS (RFI/CMS) shall incorporate and address all issues and comments by CDH and EPA in the comment letter sent by EPA and CDH to the facility dated 8/31/88, the comment letter sent by EPA to the facility dated 8/13/87 and the CDH comment letter sent to the facility dated 10/14/87
105 2	Eastern Most Out-of-Service Fuel Tank		
106	Outfall		
107	Hillside Oil Leak		
119 1	Multiple Solvent Spills		
119 2	West and East Areas		
130	Radioactive Site #1 - 800 Area		
145	Sanitary Waste Line Leak		

Table 5 Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

Operable Unit 2-903 Pad, Mound & East Trenches

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
108	Trench T-1	1. Continue with 903 Pad, Mound and East Trenches Areas RI/FS process in progress.	1 Submit an RFI/RI Workplan in accordance with section VI of the Statement of Work The RFI/RI Workplan shall incorporate a revised 903 Pad, Mound and East Trenches Phase II Sampling Plan The revised 903 Pad, Mound and East Trenches RI (RFI) must be submitted in accordance with the schedules in Table 6 of this SOW The revised Phase II Sampling Plan shall incorporate and address comments made by EPA and CDH concerning the Plan, dated 11/30/88 The revised 903 Pad, Mound and East Trenches RI (RFI) to be submitted shall incorporate and address comments made by EPA and CDH dated 3/1/88 and 3/22/88 respectively
109	Trench T-2		
110	Trench T-3		
111 1	Trench T-4		
111 2	Trench T-5		
111 3	Trench T-6		
111 4	Trench T-7		
111 5	Trench T-8		
111 6	Trench T-9		
111 7	Trench T-10		
111 8	Trench T-11		
112	903 Drum Storage Area		
113	Mound Area		
140	Reactive Metal Destruction		
153	Oil Burn Pit No 2		
154	Pallet Burn Site		
155	903 Lip Area		
183	Gas Detoxification Area		
216 2	East Spray Field, Cntr Area	1 Submit all historical information regarding the use of the east spray fields and all information gathered to date resulting from any field investigations of the sites	
216 3	East Spray Field, South Area		

Table 5. Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

Operable Unit 3-Off-site Areas

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
198	VOC s in the Groundwater	1 Deleted This site was misidentified as an individual site.	
199	Contamination of the Land's Surface	1 Submit a report detailing the history of the remedy ordered by the U S District Court pursuant to the land owner s suit settled July 10, 1985, the implementation of the remedy, and the effectiveness of the remedy Within this report include a health assessment identifying the public health risk associated with potential exposure to the public prior to completing any site remediation, during implementation of the remedy, and after completion of the Settlement Agreement imposed remedy This report must detail the effectiveness of the remedy and the risks associated with a no action alternative as well as detailing the risks associated with plausible exposure during implementation of the remedy and after completion of the remedy	1 Submit the required report in accordance with the schedules in Table 6 of the SCW
200	Great Western Reservoir	1 Submit all known and accumulated data describing, detailing or defining contamination within the reservoir and tributaries of the reservoir including surface and groundwater sources 2 Submit a health risk assessment documenting the risks derived from all potential exposures associated with a no action alternative for remediation of the contamination.	1 Submit the required reports in accordance with the schedules in Table 6 of the SCW

Table 5. Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
201	Standley Reservoir	<ol style="list-style-type: none"> 1. Submit all known and accumulated data describing, detailing or defining contamination within the reservoir and tributarys of the reservoir including surface and groundwater sources 2. Submit a health risk assessment documenting the risks derived from all potential exposures associated with a no action alternative for remediation of the contamination 	<ol style="list-style-type: none"> 1. Submit the required reports in accordance with the schedules in Table 6 of the SOW
202	Mower Reservoir	<ol style="list-style-type: none"> 1. Submit all known and accumulated data describing, detailing or defining contamination within the reservoir and tributarys of the reservoir including surface and groundwater sources 2. Submit a health risk assessment documenting the risks derived from all potential exposures associated with a no action alternative for remediation of the contamination 	<ol style="list-style-type: none"> 1. Submit the required reports in accordance with the schedules in Table 6 of the SOW

Table 5: Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

Operable Unit 4-Solar Ponds

SITF NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
101	207 Solar Evaporation Ponds	<ol style="list-style-type: none"> 1 Close the regulated units in accordance with this Agreement and the regulations 2. Submit Phase I and Phase II RFI/RI reports documenting investigations for each site in accordance with the schedules within Table 6 of this Attachment. The Phase I and Phase II reports shall at a minimum contain information to characterize the nature, rate and extent of contamination, define pathways and methods of migration, identify areas threatened by releases from the facility; and determine short and long-term threats to human health and the environment 3 Submit all Phase I and Phase II Closure/Interim Measure/Interim Remedial Action reports as required by section I B 11 of the SOW, and in accordance with the schedule requirements within Table 6 of the SOW 	<ol style="list-style-type: none"> 1 As required by section I B 11 of the SOW 2 Submit RFI/RI Workplans in accordance with section I B 11 and Table 6 of the SOW. Submit the required reports and close the units in accordance with the schedules in Table 6 of the SOW

Table 5. Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

Operable Unit 5-Woman Creek Drainage Operable Unit 6-Walnut Creek Drainage			
SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
115	Original Landfill	<ol style="list-style-type: none"> 1. Perform a Radiological Survey over the area of the landfill utilizing a side-shielded field instrument for detection of low energy radiation (FIDLER) and a shielded Geiger-Mueller (G-M) pancake detector. Readings will initially be taken on an offset 100 foot grid. If hotspots are detected the grid will be tightened to pinpoint the radiological source. The results will be plotted on a map and contoured. This investigation shall also be conducted at the solid waste disposal areas located to the east of the identified location of the old landfill as depicted in the 10/15/64, and 8/7/69 aerial photographs 2. Complete a real time soil gas analysis over the entire area of the landfill on offset 100 foot centers. The soil gas analysis will also be conducted over the area east of the identified location of the landfill as stated in (1) above. The soil gas analysis will utilize a portable GC. The detection limits for the following compounds shall be proposed in the Workplan. The soil gas survey shall analyze for the volatiles 1,1,1 TCA, dichloromethane, benzene, carbon tetrachloride, PCE and TCE. The analysis will note analytical peaks for compounds not calibrated for on the GC. Soil cores will be taken at the location of the soil gas analysis on a random basis after every 50 soil gas surveys to verify the presence or non-presence of volatiles at the specific location. If positive soil gas results are indicated, boreholes will also be placed to transect the plume(s). The soil borings will be drilled at least three feet into weathered bedrock. The boreholes transecting plumes at the site will be completed as groundwater monitoring 	<ol style="list-style-type: none"> 1. Submit an RFI/RI Workplan in accordance with section VI of the Statement of Work. Submit the Phase I RFI/RI Report in accordance with the schedules in Table 6 of the SOW. The Phase I RFI/RI Report will include all data collected as a result of and required by this preliminary workplan for this group of sites

Table 5. Preliminary RFI/RT Workplan for Previously Identified Inactive Sites

SITE	SITE NAME	REQUIRED ACTION	REQUIRED
NUMBER	SITE NAME	REQUIRED ACTION	COMPLETION/SUBMITTAL DATE
115 cont'd		wells. Composite samples will be collected from every 2 foot interval and analyzed for HSL volatiles and semi-volatiles using calibrated GC/MS. Composite samples will also be taken from each six foot interval and analyzed for HSL metals,uranium 233/234, uranium 235, uranium 238,plutonium 239/240, americium 241, cesium 137, strontium 89/90, and beryllium.	
		<p>3 Install three downgradient ground water monitoring points between the landfill and the interceptor ditch. These points must monitor alluvial groundwater quality The geology shall be characterized prior to determining the type of groundwater monitoring point to construct at each location. The first point will be placed between the western leg of the landfill and the interceptor ditch This first point will collect water from the saturated interval of the alluvial groundwater system The second point will be placed in the surface drainage north of well 57-86 between the landfill and the interceptor ditch within the area of the old embankment and will intercept groundwater from the saturated thickness of the alluvial groundwater system The third point will be placed between the southeastern corner of the unit boundary and the interceptor ditch, downgradient of the outfall identified on the southeast side of the landfill This point will be screened to intercept groundwater from the saturated thickness of the alluvial groundwater system The groundwater will be sampled quarterly and analyzed for HSL volatiles, HSL metals, HSL semivolatiles, soluble cesium 137 and strontium 89/90, insoluble beryllium, soluble and insoluble uranium, soluble and insoluble plutonium, and dissolved lead and chromium</p>	

Table 5: Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
115 cont'd		<p>4. Confirm the piping interconnections and sources of water alluded to in section 3 1.1 of Volume I, Remedial Investigation and Feasibility Study Plans for Low Priority Sites. If water is found to be flowing through the two corrugated pipes protruding from the landfill, sample the effluent and analyse the effluent for the same constituents as outlined in (3) above. The effluent shall be sampled quarterly.</p> <p>5. Sample the sediments and surface water of the interceptor ditch and Woman Creek immediately downgradient of the original landfill. Analyze the sediments for the same constituents as outlined in (3) above.</p>	
133 1	Ash Pits 1 - 4,	<p>1. Reevaluate and investigate the extent of the disposal areas for this site in light of the 1953, 1964, 1969, and 1978 through 1988 aerial photographs of the site. These include an area north of the west access road and waste areas beyond the boundaries sites 133 1 and 133.6.</p> <p>2. Conduct a radiation survey using a G-M shielded pancake detector and side-shielded FIDLER of all areas associated with site 133. The survey shall be conducted using 10 foot grids and will cover all areas affected by site 133. If "hotspots" are detected, the grid must be tightened to locate the source of the radiation.</p> <p>3. Conduct a soil sampling survey of site 133 utilizing soil borings drilled five feet into weathered bedrock. Boreholes on 25 foot centers will transect each site and will also be placed over hotspots detected during the radiometric survey of the sites. All samples will be</p>	
133 2	Incinerator and		
133 3	Concrete Wash Pad		
133 4			
133 5			
133 6			

Table 5. Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
133 cont d		<p>composited to represent 2 foot intervals and will be analyzed for total uranium, gross alpha and gross beta. Prior to drilling the boreholes, 2" surface scrape samples will be taken at "hotspots" as indicated by the radiation survey and analyzed for the same constituents as listed above</p> <p>4. Install three downgradient ground water monitoring points between site 133 and Woman Creek. These points must monitor alluvial groundwater quality. The geology shall be characterized prior to determining the type of groundwater monitoring point to construct at each location. The groundwater monitoring locations will be proposed to EPA and CDH after the geological characterization has been completed. The groundwater points will monitor the saturated interval of the alluvial groundwater system. The groundwater will be sampled quarterly and analyzed for HSL volatiles, HSL metals, HSL semivolatiles, soluble cesium 137 and strontium 89/90, soluble and insoluble beryllium, soluble and insoluble uranium, and soluble and insoluble plutonium</p>	
141	Sludge Dispersal	<p>1 Conduct a radiation survey using a G-M shielded pancake detector and side-shielded FIDLER of the areas affected by site 141. The survey shall be conducted using 25 foot grids and will cover all areas affected by site 141. If "hotspots" are detected, the grid must be tightened to locate the source of the radiation</p> <p>2 Conduct a soil sampling survey of site 141 utilizing surface soil scrapings to a depth of 2 inches. The scrapings will be collected using 25 foot grids and will</p>	

Table 5: Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
141 cont'd		also be taken from "hotspots" located during the radiometric survey. The samples will be analyzed for total plutonium, total americium, beryllium, total chromium, HSL metals, total nitrate, uranium 233/234, uranium 235, uranium 238, gross alpha and gross beta	
		3 Complete a monitoring well downgradient of site 141. The location shall be proposed to EPA and CDH for review and approval. The well shall monitor alluvial groundwater. Quarterly samples shall be taken and analyzed for HSL volatiles, HSL semi-volatiles, gross alpha and gross beta. Results of these first analyses shall be submitted in the PSC.	
142	Retention Ponds: A-1, A-2, A-3, A-4, A-5, B-1, B-2, B-3, B-4, B-5, C-1, C-2	1 Submit the Rockwell International, 1986 report, "Trends in the Rocky Flats Surface Water Monitoring". Submit all data pertaining to these ponds and their respective water and sediment quality.	
		2 Collect five surface water and five sediment samples from five locations in all A, B and C series retention ponds. At least one of the five water samples for each pond shall be taken from the deepest part of each pond. Stratification of the water column shall be identified through temperature or dissolved oxygen measurements. Water samples shall be taken from each vertically stratified zone of the pond, if applicable. One of the five water samples to be taken from each pond shall be taken within 5 feet of the inlet of the pond. One of the five water samples to be taken from each pond shall be taken within five feet of the pond spillway. One of the five sediment samples shall be taken from the bank of each pond presently below waterline. One of the five sediment samples shall be taken from the	

Table 5 Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
142 cont d		<p>bank of each pond above high waterline One of the sediment samples will be taken within five feet of the pond inlet Two of the sediment samples will be taken from the deepest parts of each pond All sediment samples shall represent the entire vertical column of sediment present at each specific location within each pond. One sediment sample and one water sample shall be taken within the confines of the pond located between the confluence of North and South Walnut Creek and Indiana Street. All of the sediment samples shall be analyzed for total plutonium 239/240, total americium 241, total uranium 233/234, total uranium 235, total uranium 238, tritium, beryllium, total chromium, total strontium 89/90, total cesium 137, gross alpha, gross beta, HSL metals, HSL volatiles, HSL semi-volatiles, and total nitrate The aqueous samples shall be analyzed for the same constituents, but will analyze for soluble and insoluble phases for HSL metals and radionuclides</p> <p>3 Collect sediment samples from seven locations upstream of pond A-1 Collect sediment samples from four locations upstream of pond B-1. The locations for the sediment samples upstream of ponds A-1 and B-1 should be approximately equally spaced and located within the stream channel conducive to the collection of sediment The upstream sediment samples should be located between the PSZ and pond A-1 and B-1 Collect sediment samples from 10 locations upstream of pond C-1 The locations for the C-1 upstream sediment samples should be approximately equally spaced and located within the stream channel and conducive to the</p>	

Table 5: Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
142 cont'd		<p>collection of sediment The sediment samples upstream of pond C-1 shall be located between pond C-1 and site 133 6. Four sediment samples should be taken approximately equally spaced and located between pond C-2 and pond C-1 within the stream channel and conducive to sediment collection. Ten sediment samples shall be taken within the south interceptor ditch, approximately equally spaced between pond C-2 and the southwest corner of the original landfill One sediment sample shall be collected between each A and B series pond within the channel and conducive to the collection of sediment. All sediment samples shall be analyzed for the same constituents as stated in number (2) above All samples shall represent the entire vertical column of sediment present at each sampling location If the sediment depth is greater than two feet, individual two foot composites shall be collected.</p> <p>4. Collect sediment samples from four locations immediately downstream of ponds A-4 and B-5, prior to the confluence of North and South Walnut Creek An additional four samples shall be collected approximately equally spaced and located between the plant and Indiana Street within Walnut Creek at locations conducive to the collection of sediment Collect sediment samples from 4 locations downstream of pond C-2. The locations for the C-2 downstream samples shall be approxiamtely equally spaced and located between the pond and Indiana Street within the channel and conducive to the collection of sediment These samples shall be analyzed for the same constituents as stated in number (2) above. All sediment samples shall represent the vertical column of sediments present at the location being</p>	

Table 5 Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
142 cont'd		<p>sampled If the sediment depth is greater than two feet, individual two foot composites shall be collected</p> <p>5 Construct two groundwater wells immediately downgradient of each dam at ponds A-4, B-5, C-2, and C-1. These wells will be constructed within the the original stream channel and will monitor the alluvial groundwater downgradient of each dam/pond Samples of the groundwater will be collected upon completion of the well and quarterly thereafter The groundwater samples will be analyzed for constituents as for the aqueous samples in (2) above Results of the analyses will be presented in the PSC to be submitted in accordance with the schedules as outlined in this Statement of Work</p>	
143	Old Outfall	<p>1. Conduct a radiation survey using a G-M shielded pancake detector and side-shielded FIDLER of the areas affected by site 143 The survey shall be conducted using 10 foot grids and will cover all areas affected by site 143 If "hotspots" are detected, the grid must be tightened to locate the source of the radiation</p> <p>2 Conduct a soil sampling survey of site 143 utilizing surface soil scrapings to a depth of 2 inches and 2 foot cores composited to represent 2 feet of soil The surface and core samples will be collected using a 20 foot grid and will also be taken from "hotspots" located during the radiometric survey The grid will extend along the drainage of the old outfall to the PSZ The samples will be analyzed for total plutonium, total americium, beryllium, total chromium, tritium, total nitrate,</p>	

Table 5. Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
143 cont'd		uranium 233/234, uranium 235, uranium 238, gross alpha, gross beta, and HSL metals	
165	Triangle Area	<ol style="list-style-type: none"> 1 Reevaluate the extent of the disposal area in light of the 1953, 1964, 1969, and 1971 aerial photographs which indicate that the site extends farther to the north, east and west than is presently acknowledged 2 Submit the report(s) documenting the radiometric survey conducted from 1975 - 1983 and any cleanup activities for this site 3 Conduct a radiation survey using a G-M shielded pancake detector and side-shielded FIDLER of the areas affected by site 165. The survey shall be conducted using 25 foot grid intervals and will cover all areas affected by this site. If "hotspots" are detected, the grid must be tightened to locate the source of the radiation 4 Complete a real time soil gas analysis over the entire area of site 165 using 50 foot grid intervals. The soil gas analysis will utilize a portable GC. Detection limits for the following compounds shall be proposed in the Workplan. The soil gas survey shall analyze for the volatiles carbon tetrachloride, TCE, methylene chloride, acetone, 2-butanone, PCE, 1,2 DCA, chloroform, and toluene. The analysis will note analytical peaks for compounds not calibrated for on the GC. Soil cores will be taken at the location of the soil gas analysis on a random basis every 25 soil gas surveys to verify the presence or non-presence of volatiles and semi-volatiles at the specific location and to determine the radioactive constituent concentration in the soils at this site. At least three borehole transects will be located to delineate VOC or 	

Table 5: Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
165 cont'd		<p>radioactive plume gradient Prior to drilling the boreholes, 2" surface scrapes will be taken and analyzed for total plutonium, uranium 233/234, uranium 235, uranium 238, gross alpha, gross beta and beryllium The soil borings will be drilled three feet into weathered bedrock Composite samples will be taken from every 2 foot interval and analyzed for HSL volatiles and HSL semivolatiles utilizing calibrated GC/MS Six foot composite samples will be analyzed for total plutonium, uranium 233/234, uranium 235, uranium 238, gross alpha, gross beta, and beryllium</p> <p>5 Two groundwater monitoring wells shall be completed to monitor the alluvial groundwater within this site One well shall be located east of the PSZ within the site and one shall be located within the PSZ, within the site Groundwater shall be sampled immediately upon completion of the wells and quarterly thereafter The groundwater shall be monitored for HSL volatiles, HSL semi-volatiles, HSL metals, gross alpha, and gross beta Initial results of the groundwater sampling and analysis shall be submitted with the PSC for this group</p>	
166 1	Trench A	1 Conduct a geophysical survey to locate and determine the extent of the 166 trenches Reevaluate the location of this site after reviewing the aerial photographs dated 10/15/64 and 8/7/69	
166 2	Trench B		
166 3	Trench C	2 Conduct a soil sampling survey of all areas affected by sites 166 1, 166 2 and 116 3 The investigation shall consist of transecting the trenches with soil boreholes placed every 25' longitudinally along each trench. Soil cores shall be drilled to a depth five feet below the bottom of each pit Soil cores shall be	

Table 5 Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
166 cont'd		composited to represent 2 feet of soil and analyzed for HSL volatiles. Core samples shall also be composited to represent six feet of soil and analyzed for total plutonium, total americium, uranium 233/234, uranium 235, uranium 238, gross alpha, gross beta, and HSL metals.	
167 1	North Area Spray Field	<ol style="list-style-type: none"> 1 Reevaluate the extent and location of the 167 2 spray field in light of the 1988 aerial photographs 2 Conduct a soil sampling survey of all areas affected by sites 167 1, 167.2 and 167.3 utilizing surface scrapes representing the top 2" of soil and soil cores drilled to a depth of 4 feet. Composites shall be sampled to represent 2 feet of soil. The core samples will be collected at grid locations 50 feet apart. The samples will be analyzed for total plutonium, total americium, uranium 233/234, uranium 235, uranium 238, gross alpha and gross beta, tritium, and HSL metals 3 Two alluvial groundwater monitoring wells shall be placed immediately downgradient of sites 167.1 and 167.3 within the surface drainages flowing to North Walnut Creek. These wells shall be screened as near the surface as possible through to weathered bedrock to intercept the saturated thickness of soil within the alluvium. The groundwater will be sampled quarterly and analyzed for HSL volatiles, soluble and insoluble uranium, soluble and insoluble plutonium, HSL metals and tritium 	
167.2	Pond Area Spray Field		
167 3	South Area Spray Field		
209	Surface disturbance Southeast of Bldg 881	<ol style="list-style-type: none"> 1 Determine and submit all historical use information pertaining to this site. Determine the nature of what appear to be trenches in the aerial photograph taken 10/15/64, 8/7/69, and 8/6/71. Determine 	

Table 5 Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRE COMPLETION/SUBMITTAL DATE
209 (cont'd)		the nature of what appears to be a pond in the aerial photograph taken 10/5-83	
216 1	East Spray Fields North Area	1 Submit all historical information regarding the use of the east spray fields and all information gathered to date resulting from any field investigation of the site	

Table 5. Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

Operable Unit 7-Present Landfill and Inactive Hazardous Waste Storage Area, Sites 114, 203

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
114	Present Landfill	1. Close the regulated units in accordance with this Agreement and the regulations.	1. As required by section I B.11 of the SOW
203	Inactive Waste Storage Area	2. Submit Phase I and Phase II RFI/RI reports documenting investigations for each site in accordance with the schedules within Table 6 of this Attachment. The Phase I and Phase II reports shall at a minimum contain information to characterize the nature, rate and extent of contamination; define pathways and methods of migration; identify areas threatened by releases from the facility; and determine short and long-term threats to human health and the environment.	2. Submit RFI/RI Workplans in accordance with section I B.11 and Table 6 of the SOW. Submit the required reports and close the units in accordance with the schedules in Table 6 of the SOW.
		3. Submit all Phase I and Phase II Closure/Interim Measure/Interim Remedial Action reports as required by section I B.11. of the SOW, and in accordance with the schedule requirements within Table 6 of the SOW.	

Table 5: Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

Operable Unit 8-700 Area

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
118.1	Multiple Solvent Spills West of Building 730 and in the South End of Building 776	<p>1. Submit the results of the Aerial Radiological Measuring System (ARMS) survey which documented the elevated gamma-radiation exposure rates for sites 118 1 and 118.2.</p> <p>2. Complete a real time soil gas analysis over the entire area of site 118 1 and 118.2 using 25 and 30 foot grid intervals, respectively. The soil gas analysis shall utilize a portable GC. The detection limits for the following compounds shall be proposed in the Workplan. The soil gas survey shall analyze for the volatiles 1,1,1 TCA, benzene, carbon tetrachloride, methylethyl ketone, dichloromethane, PCE, and TCE. The analysis shall note analytical peaks for compounds not calibrated for on the GC. Soil cores shall be taken at the location of the soil gas analysis on a random basis every 25 soil gas survey locations to verify the presence or non-presence of volatiles at the specific location. Transects of each site shall also be constructed longitudinally through each site. Four boreholes shall be constructed transecting site 118.1 and two boreholes shall be constructed to transect site 118 2. Prior to drilling each borehole, 2" soil surface scrapes shall be collected and analyzed for total plutonium, tritium, total uranium, gross alpha and gross beta. The soil boreholes shall be drilled three feet into weathered bedrock. Composite samples shall be taken from each two foot interval and shall be analyzed for HSL volatiles utilizing calibrated GC/MS.</p>	<p>1. Submit an RFI/RI Workplan in accordance with section VI of the Statement of Work. Submit the Phase I RFI/RI Report in accordance with the schedules in Table 6 of the SOW. This RFI/RI Report will include all data collected as a result of and required by this preliminary workplan for this group of sites.</p>

Table 5. Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
123 1 123 2	Valve Vault 7 and West of Bldg 707	<ol style="list-style-type: none"> 1. Submit the report(s) documenting the radiometric survey conducted from 1975 - 1983. 2. Conduct a radiation survey using a G-M shielded pancake detector and side-shielded FIDLER of sites 123 1 and 123.2. The survey method shall be proposed within the Workplan for this OU. If "hotspots" are detected the grid must be tightened to locate the source of the radiation. 3. Conduct a soil sampling survey of the areas affected by site's 123.1 & 123 2. Four soil bores will be placed around each vault associated with site 123, and shall be drilled to a depth 10 feet below the bottom of each vault. Soil samples shall be composited to define each 2 foot interval of soil and analyzed for HSL volatiles. Soil samples shall also be composited to define six foot intervals, and will be analyzed for nitrates, flourides, beryllium, total uranium, total plutonium, gross alpha, and gross beta. 	
125	Holding Tank	<ol style="list-style-type: none"> 1. Submit the report(s) documenting the radiometric survey conducted from 1975 - 1983 2. Conduct a radiation survey using a G-M shielded pancake detector and side-shielded FIDLER of site 125. If the releases occurred after surfacing was in place, then the survey should be conducted without removing the surfacing. If the surfacing was placed after the spills occurred, 	

Table 5. Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
125 (cont'd)		<p>then the top 2" of the soil surface shall be sampled and analyzed for radiation prior to drilling the boreholes. The survey shall be conducted using 10 foot grids and will cover all areas affected by site 125. If "hotspots" are detected, the grid must be tightened to locate the source of the radiation.</p> <p>3. Conduct a soil sampling survey of the areas affected by sites 125. Soil bores will be placed around each tank associated with site 125 and will be drilled to a depth 10 feet below the bottom of each tank. The soil samples shall be composited to define each 2 foot interval and will be analyzed for HSL volatiles. In addition, the soils shall be composited to represent six foot intervals and shall be analyzed for nitrates, total americium, beryllium, total uranium, total plutonium, gross alpha and gross beta. In addition to the soil bores, surface scrapes 2 inches deep will be taken at the same location as the soil borings and analyzed for the same constituents as required for the soil boring composites. At least two of the boreholes shall be completed as down-gradient alluvial monitoring wells. The location and number of these wells shall be proposed in the RFI/RI Workplan to be submitted in accordance with section I B 9 of the Statement of Work. These wells shall be sampled immediately upon completion and quarterly thereafter. Groundwater samples shall be analyzed for total nitrate, HSL volatiles, gross alpha, gross beta, total plutonium, total uranium, tritium and HSL metals.</p>	
126 1	Out-of-Service Process	1 Determine and document the types of	
126 2	Waste Tanks	wastes stored in these tanks during use	

Table 5. Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
126 cont'd		<p>2 Conduct a soil sampling survey of the areas affected by sites 126.1 and 126.2. One soil bore will be placed downgradient of each tank associated with site 126 and will be drilled to a depth 10 feet below the bottom of each tank. The soil samples shall be composited to define each 2 foot interval and will be analyzed for HSL volatiles. In addition, the soils shall be composited to represent six foot intervals and shall be analyzed for nitrates, total americium, beryllium, total uranium, total plutonium, gross alpha and gross beta. In addition to the soil bores, surface scrapes 2 inches deep will be taken at the same location as the soil borings and analyzed for the same constituents as required for the soil boring composites. The most downgradient borehole shall be completed as a down-gradient alluvial monitoring well. The location of this well shall be proposed in the RFI/RI Workplan to be submitted in accordance with section I B 9 of the Statement of Work. This well shall be sampled immediately upon completion and quarterly thereafter. Groundwater samples shall be analyzed for total nitrate, HSL volatiles, gross alpha, gross beta, total plutonium, total uranium, tritium and HSL metals. Initial results of the groundwater sampling and analysis shall be submitted with the PSC report for this group of sites.</p>	
127	Low Level Radioactive Waste Leak	<p>1 Conduct a radiation survey using a G-M shielded pancake detector and side-shielded FIDLER of site 127. The survey shall be conducted using 10 foot grids and will cover the entire area affected by site 127. If "hotspots" are detected, the grid must be tightened to locate the source of the radiation. If surfacing has been placed over the soils affected</p>	

Table 5: Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
127 cont'd		by releases from this site, 2" surface scrapes will be taken prior to constructing the required boreholes for this site.	
		2. Conduct a soil sampling survey of the areas affected by site 127. Place 5 soil borings 20 feet apart within the boundaries of the site. Collect a 2" surface scrape of the soils before constructing the soil borings. The surface scrape sample shall be analyzed for total plutonium, total uranium, gross alpha, gross beta, HSL metals and total nitrate. The soil borings will extend to 10 feet below the pipe invert carrying low level waste between 995 and 774 or three feet into weathered bedrock, whichever is greater. The soil samples will be composited to represent each 2 foot increment of depth and will be analyzed for total plutonium, total uranium, gross alpha, gross beta, and total nitrate.	
132	Radioactive Site #4 - 700	1. Conduct a soil sampling survey of the areas affected by site 132. Soil bores will be placed around each tank associated with site 132 and will be drilled to a depth 10 feet below the bottom of each tank or 3 feet into weathered bedrock, whichever is greater. The soil samples shall be composited to define each six foot interval and will be analyzed for total americium, total beryllium, total uranium, total plutonium, total alpha and total beta.	
135	Cooling Tower Blowdown	1. Verify the location of site 135 as either north or south of building 374. 2. Conduct a soil sampling survey of site 135 utilizing soil borings drilled to a depth of 6 feet. Borings will be	

Table 5: Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
135 cont d		placed on 50 foot centers. Samples will be composited to represent 2 foot intervals and will be analyzed for total chromium. A 2 inch surface scrape will be taken prior to drilling at each grid location and will be analyzed for total chromium.	
137	Cooling Tower Blowdown Building 774	1 Conduct a soil sampling survey of site 137 utilizing soil borings drilled six feet deep Borings will be placed on 50 foot centers. Samples will be composited to represent 2 foot intervals and will be analyzed for total chromium. A 2 inch surface scrape will be taken prior to drilling at each grid location and will be analyzed for total chromium.	
138	Cooling Tower Blowdown Building 779	1 Conduct a soil sampling survey of site 138 utilizing soil borings drilled to a depth of 6 feet. Borings will be placed on 25 foot centers Samples will be composited to represent 2 foot intervals and will be analyzed for total chromium. A 2" surface scrape will be taken prior to drilling at each grid location and will be analyzed for total chromium	
139 1 139 2	Caustic/Acid Spills	1. Collect soil samples from the top six inches of soil at sites 139 1 and 139 2 These samples shall be taken from soils directly surrounding the source tanks and from soils affected by the sites. The soils affected by sites 139 1 and 139.2 will be sampled using 25 foot grids and shall be analyzed for sodium, potassium, and fluoride	
144	Sewer Line Break	1 Submit the report(s) documenting the radiometric survey conducted from 1975 - 1983 2 Conduct a radiation survey using a G-M	

Table 5. Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
144 cont'd		shielded pancake detector and side-shielded FIDLER of the areas affected by site 144. The survey shall be conducted using 10 foot grids and will cover all areas affected by site 144 including the hillside referred to in the CEARP Phase I: Installation Assessment, Rocky Flats Plant. If "hotspots" are detected, the grid must be tightened to locate the source of the radiation.	
		3 Conduct a soil sampling survey of all areas affected by site 144 including the hillside 500 feet north, utilizing surface soil scrapings collected at "hotspot" locations identified through the radiation survey and prior to construction of each borehole. Two boreholes shall be located adjacent to the sewer line and shall be drilled to 5 feet below the invert of the pipe or three feet into weathered bedrock, whichever is deeper. Four boreholes shall be located on the affected hillside and shall be drilled three feet into weathered bedrock. The soil cores shall be composited to represent 2 feet of soil and analyzed for total plutonium, total americium, beryllium, total chromium, tritium, total nitrate, uranium 233/234, uranium 235, uranium 238, gross alpha, gross beta, HSL metals, and total sulfate.	
146 1	Concrete Process Waste Tanks 1	Submit the report(s) documenting the radiometric survey conducted from 1975 - 1983.	
146 2			
146 3			
146 4			
146 5		2 Verify the location of these tanks.	
146 6		3 Conduct a radiation survey using a G-M shielded pancake detector and side-shielded FIDLER of the areas affected by site 146. The survey	

Table 5: Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
146 cont'd		<p>shall be conducted using 10 foot grids and will cover all areas affected by site 146 including the road and ground surfaces affected by the overflows of these tanks. If concrete or asphalt surfacing exists over affected soils, the surface soils will be sampled prior to constructing the required boreholes. If "hotspots" are detected, the grid must be tightened to locate the source of the radiation.</p> <p>4. Conduct a soil sampling survey of all areas affected by site 146 including the areas affected by the tank overflows, utilizing surface soil scrapings to a depth of 2 inches and soil cores composited to represent each 2 feet of soil. The boreholes will be drilled to a depth of 10 feet below the tank inverts or to below the bottom of the building, whichever is required to assess the contamination of the soils related to this site. The location of six boreholes shall be proposed in the Workplan after verifying the location of these tanks. For three of the six boreholes, the core samples shall be composited to represent two foot intervals. These two foot composites shall be analyzed for HSL volatiles and HSL semi-volatiles. For all six boreholes the soils shall be composited to represent six foot intervals. The borehole composites and surface scrapes shall be analyzed for total plutonium, total americium, beryllium, total chromium, tritium, total nitrate, uranium 233/234, uranium 235, uranium 238, gross alpha, gross beta, total sodium, total sulfate and HSL metals.</p>	
149	Effluent Pipe	<p>1. Submit the report(s) documenting the radiometric survey conducted from 1975 - 1983 and any cleanup activities.</p>	

Table 5: Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
149 cont'd		for this site	
		2. Submit all soil survey information pertinent to this site acquired during the investigations of the solar ponds.	
		3. Conduct a radiation survey using a G-M shielded pancake detector and side-shielded FIDLER of the areas affected by site 149. The survey shall be conducted using 10 foot grids and will cover all areas affected by site 149 including the ground surfaces affected by the leakages of this line. If concrete or asphalt surfacing exists over affected soils, the surface soils shall be sampled prior to constructing the boreholes required for this site. If "hotspots" are detected, the grid must be tightened to locate the source of the radiation	
		4. Conduct a soil sampling survey of the soils affected by site 149 utilizing cores drilled to a depth of 5 feet below the invert of the waste line(s) which resulted in the release at this site or three feet into weathered bedrock, whichever is greater. Eleven boreholes shall be located on 50' centers along the downgradient side of the effluent pipe. The soil core samples shall be composited to represent 2 feet of soil. The two foot composite core samples will be analyzed for HSL volatiles. The soil cores shall also be composited to represent six foot intervals. The six foot cores and the surface scrapes shall be analyzed for total plutonium, total americium, beryllium, total chromium, tritium, total nitrate, uranium 233/234, uranium 235, uranium 238, gross alpha, gross beta, and HSL metals	

Table 5. Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
150	Radioactive Liquid Leaks	1. Submit the report(s) documenting the radiometric survey conducted from 1975 - 1983 and any cleanup activities for these sites.	
150 1	North of Bldg 771, West		
150 2	of Bldg 771, Between Bldgs		
150 3	771 and 774, East of Bldg.		
150 4	750, West of Bldg. 707,		
150 5	South of Bldg. 779, South		
150 6	of Bldg. 776, Northeast of	2. Conduct a radiation survey using a G-M shielded pancake detector and side-shielded FIDLER of the areas affected by site 150. The survey shall be conducted using 25 foot grids and will cover all areas affected by site 150 including the ground surfaces affected by runoff and spillage. If surfacing exists over affected soils, surface samples shall be taken prior to constructing the boreholes required for this site. If "hotspots" are detected, the grid must be tightened to locate the source of the radiation	
150 7	Bldg 779		
150 8		3. Conduct a soil sampling survey of all areas affected by site 150 utilizing surface soil scrapings to a depth of 2" and soil cores drilled three feet into weathered bedrock. Soil cores shall be composited to represent two foot intervals and shall be analyzed for HSL volatiles. Soil cores shall also be composited to represent six foot intervals. The six foot soil core composites and the 2" surface scrapes for all boreholes shall be analyzed for total plutonium, total americium, beryllium, total chromium, tritium, total nitrate, uranium 233/234, uranium 235, uranium 238, gross alpha, gross beta, total sodium, total sulfate and HSL metals. Nine boreholes constructed on 50' centers shall be located to transect site 150 1. Twenty boreholes constructed on 50' centers shall be located to transect site 150 2. Two rows of three boreholes shall be constructed to characterize site 150 3	

Table 5. Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
150 cont'd		Two rows of four boreholes shall be constructed to characterize site 150 4 Ten boreholes constructed on 75' centers shall be located to transect site 150.5 Two rows of four boreholes shall be constructed to characterize site 150 6. Ten boreholes constructed on 50' centers shall be located to transect site 150.7 Three boreholes constructed on 40' centers shall be located to transect site 150 8 The surface and core samples will also be collected from "hotspots" located during the radiometric survey.	
151	Fuel Oil Leak	1. Complete a real time soil gas analysis over the entire area of site 151 using 10 foot grid intervals The soil gas analysis will utilize a portable GC. The detection limits for the following compounds shall be proposed in the Workplan. The soil gas survey will analyze for the volatiles benzene, toluene and xylene The analysis will note analytical peaks for compounds not calibrated for on the GC Four boreholes shall be constructed to characterize the soils on all sides of the fuel oil tank The boreholes shall be drilled to a depth five feet below the bottom of the tank or three into weatered bedrock, whichever is deeper Composite samples shall be taken from every 2 foot interval and analyzed for HSL volatiles utilizing calibrated GC/MS	
159	Radioactive Site-Bldg 559	1. Submit the report(s) documenting the radiometric survey conducted from 1975 - 1983 and any cleanup activities for this site 2 Conduct a radiation survey using a G-M shielded pancake detector and side-shielded FIDLER of the areas affected by site 159 The survey shall be conducted using 10 foot grids and will cover all the areas affected by site 159.	

Table 5: Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
159 cont'd		<p>If "hotspots" are detected, the grid must be tightened to located the source of the radiation.</p> <p>3. Conduct a soil sampling survey of the soils affected by site 159 utilizing cores drilled to a depth of 5 feet below the invert of the waste line(s) or three feet into weathered bedrock, whichever is deeper. Borehole core samples will be composited to represent 2 feet of soil. The two foot composites shall be analyzed for HSL volatiles. Borehole core samples shall also be composited to represent six foot intervals of soil. The 2" surface scrapes and the six foot composites shall be analyzed for total plutonium, total americium, beryllium, total chromium, tritium, total nitrate, uranium 233/234, uranium 235, uranium 238, gross alpha, gross beta, and HSL metals. Two inch surface scrapes shall be sampled prior to constructing all boreholes and where surfacing exists to prevent the radiation survey</p>	
163 1	Radioactive Sites #3	1. Submit the report(s) documenting the radiometric survey conducted from 1975 - 1983 and any cleanup activities	
163 2	Wash Area and Buried Slab	<p>2. Investigate and determine the nature of the soil/soil mounds north of 163 1 and east of 163.2 which are identified in the 1969 and 1971 aerial photographs</p> <p>3. Conduct a radiation survey using a G-M shielded pancake detector and side-shielded FIDLER of the areas affected by site 163.1. The survey shall be conducted using 25 foot grids and shall cover all areas affected by site 163 1. If surfacing exists over affected soils, the 2" surface samples shall be taken prior to construction of the required boreholes. If "hotspots"</p>	

Table 5: Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
163 cont'd		are detected, the grid must be tightened to locate the source of the radiation.	
		4 Conduct a soil sampling survey of all areas affected by site 163.1 utilizing surface soil scrapings to a depth of 2 inches and boreholes drilled four feet deep. The borehole soil cores shall be composited to represent each 2 foot interval of soil. The surface and core samples will be collected at locations indicated as radioactive after conducting the radioactive survey. The samples will be analyzed for total plutonium, total americium, uranium 233/234, uranium 235, uranium 238, gross alpha and gross beta.	
172	Central Avenue Waste Spill	1. Conduct a radiation survey using a G-M shielded pancake detector and side-shielded FIDLER of the areas affected by site 172. The survey shall be conducted along the Central avenue and 6th Street roadsides and all other roadsides utilized to transport the wastes from the 903 Pad Area to Bldg. 771. The survey shall also examine the surface water drainages next to the north and westbound lanes of the roads utilized. Both the roadside and surface water drainage surveys shall utilize 50 foot grid intervals. If "hotspots" are detected, the grid must be tightened to locate the source of the radiation. The survey shall utilize 5 foot grid intervals within 50 feet of stopping and unloading points.	
		2 Conduct a soil and asphalt sampling survey. Soil and asphalt sampling shall be conducted at locations indicated as radioactive during the radiometric survey and at stopping and unloading points along the route. The soil samples shall be analyzed for HSL metals.	

Table 5. Preliminary RFT/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
172 cont'd		carbon tetrachloride, bis(2-ethylhexyl) phthalate, total plutonium, uranium 233/234, uranium 235, uranium 238, beryllium, gross alpha and gross beta. The asphalt samples shall be taken at areas indicated as radioactive during the radiometric survey and on 5 foot grid intervals within 50 feet of stopping and unloading points along the route. These asphalt samples shall be analyzed for the same constituents as for the soil samples, with the exception of the carbon tetrachloride and bis(2-ethylhexyl) phthalate.	
173	Radioactive Site-900 Area	<ol style="list-style-type: none"> 1. Submit information substantiating the characterization of this unit as a SWMU subject to HSWA corrective action. 2. Submit the results of the Aerial Radiological Measuring System (ARMS) survey which documented the elevated gamma-radiation exposure rates for site 173. Submit the results of the routine radiation surveys conducted in Bldg. 991 3. Conduct radiation surveys using a G-M shielded pancake detector and a side-shielded FIDLER, device of all areas affected by site 173. The survey shall be conducted using 25 foot grid intervals and will cover all areas external to Bldg. 991. At radiation survey sites indicating radioactive contamination, soil samples, surfacing (i.e. asphalt or concrete) samples or surface wipes will be taken to determine the radioactive constituents responsible for the positive radiation reading. The type of sample taken will be dependent on whether the radiation survey site is located on the soil, or on surfacing. Soils shall be grab sampled. Asphalt, concrete and/or structural surfaces shall be wipe samples. All samples will be analyzed for total plutonium, total uranium, 	

Table 5. Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE	SITE NAME		REQUIRED ACTION	REQUIRED
NUMBER				COMPLETION/SUBMITTAL DATE
173 cont'd			total americium, total cesium, total strontium, beryllium, tritium, gross alpha and gross beta.	
184	Bldg 991 Steam Cleaning		<ol style="list-style-type: none"> 1. Submit the report(s) documenting the radiometric survey(s) conducted which indicate that the radioactivity is not above background for this site 2. Investigate the spillage identified as emanating from site 184 in the 8/6/71 aerial photograph 3. Incorporate the investigation of site 184 into the radiometric investigation to be conducted at site 173 	
188	Acid Leak		<ol style="list-style-type: none"> 1. Submit documentation describing the nature of the acid leak (i.e. describe whether the acid mixture is a waste acid, and whether it contained any other metals or dissolved constituents, etc.). 2. Document any cleanup activity which took place at the time of the incident or after the incident to minimize environmental degradation 	

Table 5- Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

Operable Unit 9-Original Process Waste Lines

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
121	Original Process Waste Lines	<ol style="list-style-type: none"> 1. Close the regulated units in accordance with this Agreement and the regulations. 2. Submit Phase I and Phase II RFI/RI reports documenting investigations for each site in accordance with the schedules within Table 6 of this Attachment. The Phase I and Phase II reports shall at a minimum contain information to characterize the nature, rate and extent of contamination; define pathways and methods of migration; identify areas threatened by releases from the facility; and determine short and long-term threats to human health and the environment. 3. Submit all Phase I and Phase II Closure/Interim Measure/Interim Remedial Action reports as required by section I B 11. of the SOW, and in accordance with the schedule requirements within Table 6 of the SOW. 	<ol style="list-style-type: none"> 1 As required by section I B 11 of the SOW 2 Submit RFI/RI Workplans in accordance with section I B 11 and Table 6 of the SOW. Submit the required reports and close the units in accordance with the schedules in Table 6 of the SOW.

Table 5: Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

Operable Unit 10-Other Outside Closures

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
124	Radioactive Liquid Waste	1. Close the regulated units in accordance with this Agreement and the regulations	1 As required by section I B 11 of the SOW
124 1	Storage Tanks		
124 2			
124 3			
129	Oil Leak	2. Submit Phase I and Phase II RFI/RI reports documenting investigations for each site in accordance with the schedules within Table 6 of this Attachment. The Phase I and Phase II reports shall at a minimum contain information to characterize the nature, rate and extent of contamination; define pathways and methods of migration; identify areas threatened by releases from the facility; and determine short and long-term threats to human health and the environment.	2. Submit RFI/RI Workplans in accordance with section I B 11 and Table 6 of the SOW. Submit the required reports and close the units in accordance with the schedules in Table 6 of the SOW
174	P&UD Container Storage		
175	S&W Bldg 980 Container		
176	S&W Contractor Storage Yard		
177	Bldg 885 Drum Storage Area		
181	Bldg 334 Cargo Container		
182	Bldg 444/453 Drum Storage	3. Submit all Phase I and Phase II Closure/Interim Measure/Interim Remedial Action reports as required by section I B 11 of the SOW, and in accordance with the schedule requirements within Table 6 of the SOW	
170	P&UD Storage Yard Waste Spills		
205	Bldg 460 Sump #3 Acid Side		
206	Inactive Tank D-836		
207	Inacative 444 Acid Dumpster		
208	Inactive 444/447 Waste Storage Area		
210	Unit 16, Bldg 980 Cargo Container		
213	Unit 15, 904 Pad Pondcrete Storage		
214	Unit 25, 750 Pad Pondcrete and Saltcrete Storage		

Table 5: Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

Operable Unit 11-West Spray Field

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
168	West Spray Field	<ol style="list-style-type: none"> 1. Close the regulated units in accordance with this Agreement and the regulations 2. Submit Phase I and Phase II RFI/RI reports documenting investigations for each site in accordance with the schedules within Table 6 of this Attachment. The Phase I and Phase II reports shall at a minimum contain information to characterize the nature, rate and extent of contamination; define pathways and methods of migration; identify areas threatened by releases from the facility; and determine short and long-term threats to human health and the environment. 3. Submit all Phase I and Phase II Closure/Interim Measure/Interim Remedial Action reports as required by section I.B 11. of the SOW, and in accordance with the schedule requirements within Table 6 of the SOW 	<ol style="list-style-type: none"> 1 As required by section I B 11 of the SOW 2 Submit RFI/RI Workplans in accordance with section I B 11 and Table 6 of the SOW Submit the required reports and close the units in accordance with the schedules in Table 6 of the SOW

Table 5: Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

Operable Unit 12-400/800 Area Sites			
SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
116 1	Multiple Solvent Spills at	1. Submit the results of the Aerial	1 Submit an RFI/RI
116 2	West and South Loading Dock Areas	Radiological Measuring System (ARMS) survey which documented the elevated gamma-radiation exposure rates for sites 116.1 and 116.2.	Workplan in accordance with section VI of the Statement of Work Submit the Phase I RFI/RI Report in accordance with the schedules within Table 6 of the SOW This agreement This report shall include all data collected as a result of and required by this preliminary workplan for this group of sites
		2. Conduct a radiation survey using a G-M shielded pancake detector and side-shielded FIDLER of sites 116.1 and 116 2 The survey must be conducted using 25 foot grid intervals and will cover the entire areas of sites 116 1 and 116.2. If surfacing exists over affected soils, 2" surface scrapes shall be collected prior to construction of the boreholes required for this site The 2" inch surface scrapes shall be analyzed for total uranium, gross alpha and gross beta Submit all previously collected radiation data pertinent to this site.	
		3. Complete a real time soil gas analysis over the entire area of both sites using 25 foot grid intervals The soil gas analysis will utilize a portable GC The detection limits for the following compounds shall be proposed in the Workplan. The soil gas survey will analyze for the volatiles 1,1,1 TCA, benzene, carbon tetrachloride, PCE, and TCE The analysis will note analytical peaks for compounds not calibrated for on the GC. Boreholes will be constructed to transect any plume defined during the soil gas analysis These boreholes shall be completed as groundwater monitoring wells constructed to collect alluvial groundwater These alluvial groundwater monitoring wells shall be sampled immediately upon completion and analyzed for HSL volatiles, gross alpha and gross beta The ground-water shall continue to be sampled and analyzed for the above constituents	

Table 5: Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
116 cont d		on a quarterly basis. Boreholes shall also be constructed on a random basis after every 20 soil gas surveys to verify the presence or non-presence of HSL volatiles and HSL semi-volatiles at the specific location. The soil borings shall be drilled three feet into weathered bedrock 2" surface scrapes shall be collected prior to constructing the boreholes and analyzed for total uranium, gross alpha and gross beta. Composite samples shall be collected from every 2 foot interval and analyzed for HSL volatiles and HSL semi-volatiles utilizing calibrated GC/MS The uppermost two foot composite shall be analyzed for total uranium, gross alpha and gross beta	
120 1	Building 664 Fiberglassing	1	Submit the results of the Aerial Radiological Measuring System (ARMS) survey which documented the elevated gamma-radiation exposure rates for sites 120.1 and 120 2.
120 2	Areas	2	Conduct a radiation survey using a G-M shielded pancake detector and side-shielded FIDLER of sites 120 1 and 120 2 The survey must be conducted utilizing 25 foot grid intervals. If the affected soils have been covered by asphalt or concrete, 2" surface scrapes shall be taken at borehole locations required to be constructed by this workplan. 2" surface scrapes shall also be taken at all radiation survey locations indicating a positive radiation finding The 2' surface scrapes shall be analyzed for total plutonium, total uranium, gross alpha and gross beta If "hotspots" are detected, the grid must be tightened to locate the source of the radiation

Table 5- Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
120 cont'd		<p>3. Complete a real time soil gas analysis over the entire area of sites 120 1 and 120.2 using 25 foot grid intervals. The soil gas analysis will utilize a portable GC. The detection limits for the following compounds shall be proposed in the Workplan. The soil gas survey will analyze for benzene, carbon tetrachloride, methylethyl ketone peroxide, styrene and TCE. The analysis will note analytical peaks for compounds not calibrated for on the GC. Boreholes shall be constructed to transect plumes identified by the soil gas analysis and on a random basis every 25 soil gas surveys to verify the presence or non-presence of volatiles at the specific location. The boreholes shall be drilled three feet into the weathered bedrock. Composite samples shall be taken from every 2 foot interval and analyzed for HSL volatiles and HSL semi-volatiles utilizing calibrated GC/MS.</p>	
136 1	Cooling Tower Ponds	1. Submit the results of the aerial radiological survey conducted in August 1981 and documented by E,C&G, 1982.	
136 2	Northeast, South and West		
136 3	of Building 460	<p>2 Conduct a radiation survey using a G-M shielded pancake detector and side-shielded FIDLER of the areas associated with sites 136.1, 136.2 and 136 3. If these sites are presently covered by an asphalt or concrete surfacing, 2" surface scrapes must be collected prior to constructing the required boreholes for these sites. The survey must be conducted using 10 foot grids and will cover the entire area affected by sites 136 1, 136 2, and 136.3. If "hotspots" are detected, the grid must be tightened to locate the source of the radiation.</p> <p>3 Conduct a soil sampling survey of sites 136 1, 136 2 & 136 3 utilizing soil borings drilled three feet into weathered bedrock. The borings shall be</p>	

Table 5. Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
136 cont'd		located as close to the unit sources as possible. Borings shall be placed on 20 foot centers and shall be composited to represent 2 foot intervals. 2" surface scrapes shall be collected prior to constructing the boreholes. The borehole composites and the 2" surface scrapes shall be analyzed for total chromium, total uranium, total lithium, gross alpha, and gross beta.	
147 1	Process Waste Leaks;	1. Submit the report(s) documenting the radiometric survey conducted from 1975 - 1983 and any cleanup activities for these sites	
147.2	Maas and Owen Areas	2 Investigate and report the nature of the seeping to the ditch identified in the 1978 aerial photograph shown east of site 147.1 at the road entering the PSZ. This seep shall be investigated as for item (3) below. Clarify what "conversion" processes were conducted at site 147 2	
		3 Conduct a soil sampling survey of the soils affected by site 147 1 utilizing cores drilled to a depth of 5 feet below the invert of the waste line(s) which resulted in the release at this site or three feet into weathered bedrock, whichever is deeper. Prior to constructing the boreholes, 2" surface scrapes shall be collected and analyzed for total plutonium, beryllium, uranium 233/234, uranium 235, uranium 238, gross alpha, gross beta and HSI metals. Ten boreholes shall be located immediately downgradient of the pipeline within the site boundary, spaced on 20' centers Three boreholes shall be located within the spill area identified in the 1978 aerial photograph The boreholes samples shall be composited to represent 2 feet of soil. The two foot composites shall be analyzed for	

Table 5: Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
147 cont'd		HSL volatiles The borehole cores shall also be composited to represent six foot intervals. The six foot composites shall be analyzed for total plutonium, total americium, beryllium, total chromium, tritium, total nitrate, uranium 233/234, uranium 235, uranium 238, gross alpha, gross beta, and HSL metals	
157 2	Radioactive Site South Area	<ol style="list-style-type: none"> 1 Submit the report(s) documenting the radioactive survey conducted from 1975 - 1983 and any cleanup activities for these sites. 2. Conduct a radiation survey using a G-M shielded pancake detector and side-shielded FIDLER of the areas affected by site 157 2 The survey shall be conducted using 25 foot grids and will cover all areas affected by site 157.2. If surfacing exists over affected soils, 2" surface scrapes shall be collected prior to constructing the boreholes required for this site If "hotspots" are detected, the grid must be tightened to locate the source of the radiation 3 Conduct a soil sampling survey of all areas affected by site 157.2 utilizing surface soil scrapings to a depth of 2 inches and boreholes drilled three feet into weathered bedrock Boreholes and surface scrapes shall be located at "hotspots" located during the radiometric survey of this site. The workplan to be submitted for this group of sites shall also propose locations for boreholes to be located near loading docks and storage areas previously and presently used at this site. The boreholes shall be composited to represent 2 feet of soil The two foot composites shall be analyzed for HSL volatiles The boreholes shall also be 	

Table 5: Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
157.2 cont'd		composited to represent six foot intervals. The six foot composite samples and 2" surface scrapes shall be analyzed for total plutonium, beryllium, uranium 233/234, uranium 235, uranium 238, gross alpha, gross beta and bis(2-ethylhexyl) phthalate.	
187	Acid Leaks (2)	1. Submit documentation describing the nature of the acid leaks (identify whether these were waste acids, product acids, and whether they contained any other metals or dissolved constituents, etc.?).	
189	Multiple Acid Spills	1. Submit documentation describing the nature of the acid spills (identify whether these waste acids, product acids, and whether they contained any other metals or dissolved constituents, etc.?).	

Table 5: Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

Operable Unit 13-100 Area

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
117.1 117 3	Chemical Storage, North and South Sites	1. Provide information documenting the kinds of material/chemicals stored at these two sites. Provide the information utilized to preliminarily determine whether these sites require further investigation.	1 Submit an RFI/RI Workplan in accordance with section VI of the Statement of Work. Submit the Phase I RFI/RI Report in accordance with the schedules within Table 6 of the SOW This Phase I RFI/RI report shall include all data collected as a result of and required by this workplan for this group of sites.
117 1 117 2 117 3	Chemical Storage, North Middle and South Sites	1. Complete a real time soil gas analysis over the entire area of the 117 sites using 100' offset grid intervals. The soil gas analysis will utilize a portable GC. The detection limits for the following compounds shall be proposed in the Workplan. The soil gas survey shall analyze for TCA, benzene, carbon tetrachloride, dichloromethane, PCE and TCE The analysis will note analytical peaks for compounds not calibrated for on the GC Boreholes shall be constructed to transect the plumes identified during the soil gas analysis The transecting boreholes shall be completed as alluvial ground water monitoring wells. The alluvial groundwater shall be sampled immediately upon completion and quarterly thereafter, and analyzed for HSL volatiles and HSL semi-volatiles, as well as gross alpha and gross beta Boreholes shall be constructed at the location of the soil gas analysis on a random basis after every 25 soil gas surveys to verify the presence or non-presence of HSL volatiles and HSL semi-volatiles at the specific location All soil borings shall be drilled three feet into weathered bedrock. Borehole composite samples shall be taken from every 2 foot interval and analyzed for HSL volatiles	

Table 5. Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
117 cont'd		and HSL semi-volatiles utilizing calibrated GC/MS. The 2 foot composites shall also be analyzed for gross alpha and gross beta	
122	Underground Concrete Tank(s)	<p>1. Locate and describe all underground tanks associated with site 122, including the specific waste streams handled by these tanks</p> <p>2. Conduct a radiation survey using a G-M shielded pancake detector and side-shielded FIDLER of site 122. The survey shall be conducted using 10 foot grids and shall cover the entire area of site 122. If "hotspots" are detected, the grid must be tightened to locate the source of the radiation. If the affected soils are covered with surfacing, 2" surface scrapes shall be collected prior to constructing the boreholes required for this site.</p> <p>3 Conduct a soil sampling survey after locating the underground tanks. Four boreholes shall be placed around each tank associated with site 122 and shall be drilled to a depth 10 feet below the bottom of each tank or three feet into weathered bedrock, whichever is deeper. The soil samples shall be composited to define each 2 foot interval and shall be analyzed for HSL volatiles and nitrates. The soil samples shall also be composited to represent six foot intervals. The 2" surface scrapes and six foot composites shall be analyzed for total uranium, total plutonium, gross alpha and gross beta.</p>	
128	Oil Burn Pit No 1 Waste Leak	<p>1 Reevaluate the location of site 128 in light of the 7/2/55 aerial photograph of the facility</p> <p>2 Conduct a radiation survey using a G-M shielded pancake detector and side-</p>	

Table 5. Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
128 cont d		<p>shielded FIDLER of site 128 The survey shall be conducted using 10 foot grids and shall cover the entire area affected by site 128. If "hotspots" are detected, the grid must be tightened to locate the source of the radiation</p> <p>3. Complete a real time soil gas analysis over the entire area of site 128 using 25 foot grid intervals. The soil gas analysis will utilize a portable GC The detection limits for the following compounds will be proposed in the Workplan The soil gas survey shall analyze for the volatiles benzene, toluene, and xylene. The analysis will note analytical peaks for compounds not calibrated for on the GC Boreholes shall be constructed to transect plumes identified by the soil gas analysis or the radiation survey At least three boreholes shall be constructed to verify the presence or non-presence of volatiles or radioactive materials at specific locations within the site The boreholes shall be drilled three feet into the weathered bedrock. Composite samples shall be collected from every 2 foot interval and analyzed for HSL volatiles and HSL semi-volatiles utilizing calibrated GC/MS The two foot composite samples shall also be analyzed for total uranium and total lithium</p>	
134	Lithium Metal Destruction Site	1. To be investigated in same manner as for site 128 above.	
148	Waste Spills	<p>1 Submit the report(s) documenting the radiometric survey(s) conducted which have found radioactivity levels to be consistent with background levels</p> <p>2 Conduct a radiation survey using a G-M shielded pancake detector and side-shielded FIDLER of site 148 The survey shall be conducted using 10 foot spacing</p>	

Table 5: Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
148 cont'd		<p>around building 123 and will cover the entire area affected by site 148. If "hotspots" are detected, the grid must be tightened to locate the source of the radiation. If surfacing exists over grid locations, 2" surface scrapes shall be collected prior to constructing the boreholes required for this site.</p> <p>3. Conduct a soil sampling survey of site 148 utilizing soil borings drilled to a depth of 2 feet. The soil borings shall be drilled at locations proposed in the workplan for this group and at sites found to be radioactive after completion of the radiation survey. Soil cores shall be composited to represent 6" of soil. The 2" surface scrapes and the 6" composites shall be analyzed for total plutonium, total americium, uranium 238, uranium 235, uranium 233/234, gross alpha and gross beta.</p>	
152	Fuel Oil Tank	<p>1. Complete a real time soil gas survey over the entire area of site 152 using 20 foot spacing around the fuel oil tank. The soil gas analysis will utilize a portable GC. The detection limits for the following compounds shall be proposed in the Workplan. The survey shall analyze for benzene, toluene and xylene. The analysis will note analytical peaks for compounds not calibrated for on the GC.</p> <p>2. Conduct a soil sampling survey of the area affected by site 152 utilizing 6 foot cores composited to represent 6 feet of soil. Three boreholes shall be located around the fuel oil storage tank to characterize the source soils and to determine the downgradient release of contaminants from this site. The samples will be analyzed by GC/MS for HSL volatiles. The report will note analytical peaks found which were not calibrated for on the GC/MS.</p>	

Table 5: Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
157 1	Radioactive Site North Area	<ol style="list-style-type: none"> 1. Submit the report(s) documenting the radiometric survey conducted from 1975 - 1983 and any cleanup activities for this site. 2. Conduct a radiation survey using a G-M shielded pancake detector and side-shielded FIDLER of the areas affected by site 157 1. The survey shall be conducted using 25 foot grids and shall cover the areas affected by site 157 1. If surfacing exists over the affected soils, 2" surface scrapes shall be collected prior to constructing the boreholes required for this site. If "hotspots" are detected, the grid must be tightened to locate the source of contamination 3. Conduct a soil sampling survey of all areas affected by site 157 1 utilizing surface soil scrapings to a depth of 2 inches and 6 foot boreholes. The boreholes shall be composited to represent the entire six foot interval and three two foot intervals. The surface scrape and borehole locations shall be proposed in the workplan for this group. Boreholes and surface scrapes shall also be constructed and collected at "hotspots" located during the radiometric survey. The 2' foot composites shall be analyzed for HSL volatiles. The six foot composite shall be analyzed for total plutonium, beryllium, uranium 238, uranium 235, uranium 233/234, gross alpha, gross beta 	
158	Radioactive Site-Bldg 551	<ol style="list-style-type: none"> 1. Conduct a radiation survey using a G-M shielded pancake detector and side-shielded FIDLER of the areas affected by site 158. The survey shall be conducted using 25 foot grids and shall cover all areas affected by site 158. If surfacing exists over 	

Table 5. Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
171 cont'd		and methylene chloride One borehole shall be located within this site to verify the presence or non-presence of solvents and radioactive constituents at this site.	
186	Valve Vault 12	<ol style="list-style-type: none"> 1. Submit documentation describing the cleanup operations completed and those described as continuing in Appendix I, 3004(u) Waste Management Units, Volume I. 2. Conduct a soil sampling survey of all areas affected by site 186 utilizing soil cores drilled to 5 feet below the invert of the waste line(s) which leaked, or three feet into weathered bedrock, whichever is deeper The core samples shall be composited to represent 2 feet of soil and shall be analyzed for HSL volatiles The boreholes shall also be composited to represent six foot intervals shall be analyzed for total plutonium, total americium, uranium 233/234, uranium 235, uranium 238, gross alpha, gross beta and HSL metals The boreholes shall be located using 25 foot spacing 	
190	Caustic Leak	<ol style="list-style-type: none"> 1. Submit documentation describing the nature of the caustic leaks (i e describe whether these were waste or product solutions, and whether they contained any other metals or dissolved constituents) 	
191	Hydrogen Peroxide Spill	<ol style="list-style-type: none"> 1. Submit documentation describing the nature of the hydrogen peroxide (i e describe whether the peroxide was waste or product solution, and whether it contained any other dissolved constituents) 	

Table 5: Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

Operable Unit 14-Radioactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
131	Radioactive Site #1 700 Area	<ol style="list-style-type: none"> 1. Submit the results of the Aerial Radiological Measuring System (ARMS) survey which documented the elevated gamma-radiation exposure rates for site 131. 2. Investigate and document the location of this site. CEARP phase I and II locate this area north of building 776, while the RI/FS Plans for Low Priority Sites suggests that the area to be investigated is north and west of building 776. 3. Conduct a soil sampling survey of site 131 utilizing soil borings drilled two feet below the natural surface on 25 foot centers. Borehole samples shall be composited to represent the two foot interval. 2" surface scrapes shall be collected prior to constructing the boreholes required for this site. The surface scrapes and borehole composites shall be analyzed for total plutonium, total americium, uranium 238, uranium 235, uranium 233/234, gross alpha and gross beta. If the natural soils are covered by an artificial surface, a 2" surface scrape of the soil below the artificial surfacing will also be collected and analyzed for the same constituents as are required above for the soil borings at this site. 	<ol style="list-style-type: none"> 1. Submit an RFI/RI Workplan in accordance with section VI of the Statement of Work. Submit the Phase I RFI/RI Report in accordance with the schedules in Table 6 of the SOW. This Phase I RFI/RI report shall include all data collected as a result of and required by this workplan for this group of sites.
156	Radioactive Soil Burial		
156 1	Bldg 334 Parking Lot		
156 2	Soil Dump Area	<ol style="list-style-type: none"> 1. Conduct a radiation survey using a G-M shielded pancake detector and side-shielded FIDLER of the areas affected by site 156 2. The survey shall be conducted using 25 foot grids and will cover the all areas affected by site 156 2. Site 156.1 shall be surveyed for radiation during the soil sampling survey. If "hotspots" are 	

Table 5: Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
156 cont'd		detected, the grid must be tightened to locate the source of the radiation.	
		2 Conduct a soil sampling survey of all areas affected by site 156.1 utilizing undisturbed surface soil scrapings to a depth of 2" Conduct a soil sampling survey of site 156 2 utilizing surface scrapings of undisturbed soil to a depth of 2" and boreholes drilled three feet into the undisturbed soils beneath the waste piles of the soil dump area The soil cores shall be composited to represent 2 feet of soil. The surface scrapes for site 156.1 shall be collected using 50 foot grids. The surface scrapes and boreholes for site 156 2 shall be located on 50' centers around the perimeter of the site where dumping has occurred. The boreholes and surface scrapes for site 156.2 shall also be taken from "hotspots" located during the radiometric survey. All samples will be analyzed for total plutonium, total americium, uranium 233/234, uranium 235, uranium 238, gross alpha and, gross beta.	
160	Bldg 444 Parking Lot	1 Submit the report(s) documenting the radiometric survey conducted from 1975 - 1983 and any cleanup activities for these sites	
161	Bldg 664	2 Submit the results of the Aerial Radiological Measuring System (ARMS) survey which documented the elevated gamma-radiation exposure rates for site 161	
		3 Complete a real time soil gas analysis over the entire areas of sites 160 and 161 using 50 offset grid intervals The soil gas analysis will utilize a portable GC The detection limits for the following compounds shall be proposed in the Workplan The soil gas survey shall analyze for the volatiles	

Table 5: Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
160/161 cont'd		<p>1,1,1 TCA, PCE, carbon tetrachloride, acetone, toluene and benzene. The analysis shall note analytical peaks for compounds not calibrated for on the GC</p> <p>Boreholes shall be constructed to transect plumes identified by the soil gas analysis Boreholes shall be constructed, on a random basis, to investigate one of every 25 soil gas survey locations to verify the presence or non-presence of volatiles or radioactive materials at specific locations within the site Boreholes shall also be constructed to transect any plume identified after conducting the soil gas survey. All boreholes shall be drilled three feet into the weathered bedrock Composite samples shall be collected from every 2 foot interval and analyzed for HSL volatiles and HSL semi-volatiles utilizing calibrated GC/MS. A six foot composite shall also be collected from the uppermost interval of soil. Prior to constructing the boreholes, 2" surface scrapes shall be collected. The upper six feet and the 2" surface scrape shall be analyzed for total uranium, total plutonium, gross alpha and gross beta</p> <p>The transecting boreholes shall be completed as alluvial groundwater monitoring wells The wells shall be sampled and analyzed immediately upon completion and quarterly thereafter. The groundwater samples shall be analyzed for HSL volatiles, HSL semi-volatiles, HSL metals, total plutonium, total uranium, gross alpha and gross beta</p> <p>4 Determine and verify the destination of the soils excavated during the removal activities described as occurring in the early 1970s.</p>	
162	Radioactive Site 700 Area Site #2	<p>1 Submit all documentation identifying where the radioactive areas are and what</p>	

Table 5. Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
162 cont'd		was done to 8th street.	
		2. Locate, sample and mark the radioactive portions of 8th Street which were covered by road surfacing.	
164	Radioactive Sites-800 Area	1. Submit the results of the Aerial Radiological Measuring System (ARMS) survey which documented the elevated gamma-radiation exposure rates for site 164.1.	
164.1	Concrete Slab		
164 2	Bldg 886 Spills		
164.3	Bldg 889 Storage Pad	2 Conduct a radiation survey using a G-M shielded pancake detector and side-shielded FIDLER of the areas affected by sites 164.1, 164.2 and 164.3. The survey shall be conducted using 25 foot grids and will cover the all areas affected by these sites. If surfacing exists over affected soils, 2" surface scrapes shall be collected prior to constructing boreholes required for this site. If the surfacing has been affected the surfacing shall be sampled and analyzed for radioactive constituents If "hotspots" are detected, the grid must be tightened to locate the source of the radiation.	
		3. Conduct a soil sampling survey of all areas affected by sites 164 1, 164 2 and 164.3 utilizing surface soil scrapings to a depth of 2 inches and 6 foot boreholes composited to represent 2 feet of soil and six feet of soil The surface and borehole composite samples shall be collected at locations indicated as radioactive after conducting the radioactive survey The workplan to be submitted for this group of sites shall propose borehole locations for those radiation survey grid locations which are presently covered with surfacing The six foot borehole composite and surface scrape samples shall be analyzed	

Table 5. Preliminary RFI/RI Workplan for Previously Identified
Inactive Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
164 cont,d		for total plutonium, total americium, uranium 233/234, uranium 235, uranium 238, gross alpha, and gross beta The two foot composites shall be analyzed for HSL volatiles and HSL semi-volatiles.	

Table 5- Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

Operable Unit 15-Inside Building Closures

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
178	Bldg. 881 Drum Storage Area	1. Close the regulated units in accordance with this Agreement and the regulations	1. As required by section I B 11 of the SOW
179	Bldg 865 Drum Storage Area	2. Submit Phase I and Phase II RFI/RI reports documenting investigations for each site in accordance with the schedules within Table 6 of this Attachment The Phase I and Phase II reports shall at a minimum contain information to characterize the nature, rate and extent of contamination; define pathways and methods of migration; identify areas threatened by releases from the facility; and determine short and long-term threats to human health and the environment.	2. Submit RFI/RI Workplans in accordance with section I B 11 and Table 6 of the SOW Submit the required reports and close the units in accordance with the schedules in Table 6 of the SOW
180	Bldg 883 Drum Storage Area		
204	Original Uranium Chip Roaster		
211	Unit 26, Bldg 881 Drum Storage		
212	Unit 63, Bldg 371 Drum Storage		
215	Tank T-40, Unit 55 13		
217	Unit 32, Bldg 881 Cyanide Bench Scale Treatment	3. Submit all Phase I and Phase II Closure/Interim Measure/Interim Remedial Action reports as required by section I B 11. of the SOW, and in accordance with the schedule requirements within Table 6 of the SOW	

Table 5. Preliminary RFI/RI Workplan for Previously Identified Inactive Sites

Operable Unit 16-Low Priority Sites

SITE NUMBER	SITE NAME	REQUIRED ACTION	REQUIRED COMPLETION/SUBMITTAL DATE
185	Solvent Spill	1 Submit documentation required to substantiate the cleanup of this site and justify whether further action is required for this site.	1 Submit the documentation and data required to justify whether further action is required for the sites within this site group. If the data submitted does not allow a no further action determination to be made, then further action shall be required by EPA and CDH. The documentation must be submitted in accordance with the schedules in Table 6 of the SOW.
192	Antifreeze Discharge	1. Submit documentation justifying whether further action is appropriate for this site.	
193 194	Steam Condensate Leaks	1 Submit documentation justifying whether further action is appropriate for this site.	
195	Nickel Carbonyl Disposal	1 Submit documentation justifying whether further action is appropriate for this site.	
196	Water Treatment Plant Backwash Pond	1 Submit documentation justifying whether further action is appropriate for this site.	
197	Scrap Metal Sites	1 Submit documentation justifying whether further action is appropriate for this site.	

TABLE 6
FEDERAL FACILITY AGREEMENT AND CONSENT ORDER
MILESTONE SCHEDULE

OU 1
881 HILLSIDE

OU 1 PHASE III RCRA FACILITY INVESTIGATION/REMEDIAL
INVESTIGATION (RFI/RI)

Submit Draft Phase III RFI/RI Work Plan	February 6, 1990
Submit Final Phase III RFI/RI Work Plan	October 30, 1990
Submit Draft Phase III RFI/RI Report	July 30, 1992
Submit Final Phase III RFI/RI Report	January 4, 1993

OU 1 CORRECTIVE MEASURES STUDY/FEASIBILITY
STUDY (CMS/FS)

Submit Draft CMS/FS Report	March 31, 1993
Submit Final CMS/FS Report	September 27, 1993

OU 1 CORRECTIVE AND REMEDIAL ACTION PROPOSED PLAN (PP)

Submit Draft PP	September 27, 1993
Submit Final PP	January 4, 1994
Submit Responsiveness Summary	May 6, 1994
Submit Final Responsiveness Summary	August 3, 1994

OU 1 CORRECTIVE ACTION DECISION AND RECORD OF
DECISION (CAD/ROD)

Submit Draft CAD/ROD	August 3, 1994
Submit Final CAD/ROD	November 1, 1994

OU 1 CORRECTIVE/REMEDIAL DESIGN (CD/RD)

Submit CD/RD Work Plan	November 1, 1994
Submit Draft Title II Design	July 5, 1995
Submit Final Title II Design	October 3, 1995

OU 1 CORRECTIVE/REMEDIAL ACTION

Begin Corrective/Remedial Action Construction	May 7, 1996
Complete Corrective/Remedial Construction	November 4, 1997
Submit Performance Assessment Report	February 10, 1998

OU 1 INTERIM MEASURE/INTERIM REMEDIAL ACTION (IM/IRA)

Submit Draft Proposed IM/IRA Decision Document	September 18, 1989
Submit Proposed IM/IRA Decision Document	October 6, 1989
Submit Final IM/IRA Decision Document	January 5, 1990
Submit IM/IRA Implementation Document	February 22, 1991
Begin Phase I-A IM/IRA Construction	January 15, 1990
Begin Phase I-B IM/IRA Construction	October 8, 1990
Begin Phase II-A IM/IRA Construction	April 1, 1991
Begin Phase II-B IM/IRA Construction	September 3, 1991
Complete IM/IRA Construction	March 2, 1992
Begin IM/IRA Testing	August 5, 1991

TABLE 6
FEDERAL FACILITY AGREEMENT AND CONSENT ORDER
MILESTONE SCHEDULE

OU 2
903 PAD, MOUND, & EAST TRENCHES

OU 2 PHASE II RCRA FACILITY INVESTIGATION/REMEDIAL
INVESTIGATION (RFI/RI)

Submit Draft Phase II RFI/RI Work Plan (Alluvial)	December 21, 1989
Submit Final Phase II RFI/RI Work Plan (Alluvial)	April 12, 1990
Submit Draft Phase II RFI/RI Work Plan (Bedrock)	February 5, 1991
Submit Final Phase II RFI/RI Work Plan (Bedrock)	July 2, 1991
Submit Draft Phase II RFI/RI Report	March 12, 1993
Submit Final Phase II RFI/RI Report	August 9, 1993

OU 2 CORRECTIVE MEASURES STUDY/FEASIBILITY STUDY (CMS/FS)

Submit Draft CMS/FS Report	November 4, 1993
Submit Final CMS/FS Report	May 10, 1994

OU 2 CORRECTIVE AND REMEDIAL ACTION PROPOSED PLAN (PP)

Submit Draft PP	May 10, 1994
Submit Final PP	August 9, 1994
Submit Responsiveness Summary	December 13, 1994
Submit Final Responsiveness Summary	March 16, 1995

OU 2 CORRECTIVE ACTION DECISION/RECORD OF DECISION (CAD/ROD)

Submit Draft CAD/ROD	March 16, 1995
Submit Final CAD/ROD	June 15, 1995

OU 2 CORRECTIVE/REMEDIAL DESIGN (CD/RD)

Submit CD/RD Work Plan	June 15, 1995
Submit Draft Title II Design	February 15, 1996
Submit Final Title II Design	June 14, 1996

OU 2 CORRECTIVE/REMEDIAL ACTION

Begin Corrective/Remedial Action Construction	January 20, 1997
Complete Corrective/Remedial Action Construction	July 20, 1998
Submit Performance Assessment Report	October 15, 1998

OU 2 INTERIM MEASURE/INTERIM REMEDIAL ACTION (IM/IRA)

Submit Draft Proposed IM/IRA Decision Document	June 19, 1990
Submit Proposed IM/IRA Decision Document	September 18, 1990
Submit Draft Responsiveness Summary and Final IM/IRA Decision Document	December 13, 1990
Field Treatability Test System Installation Complete	March 8, 1991
Begin Field Treatability Testing	March 11, 1991
Submit Draft Treatability Test Report	April 1, 1992
Submit Final Treatability Test Program Report	June 2, 1992
Complete IM/IRA Construction	September 30, 1991
Begin Field Treatability Testing (Entire System)	October 30, 1991

TABLE 6
FEDERAL FACILITY AGREEMENT AND CONSENT ORDER
MILESTONE SCHEDULE

OU 3
OFF-SITE RELEASES

OU 3 DRAFT REMEDY REPORT

Submit Draft Past Remedy Report October 26, 1990

Submit Final Past Remedy Report April 2, 1991

OU 3 HISTORICAL INFORMATION AND PRELIMINARY
HEALTH RISK ASSESSMENT

Submit Draft Historical Information and Preliminary
Health Risk Assessment Report November 9, 1990

Submit Final Historical Information and Preliminary
Health Risk Assessment Report April 16, 1991

OU PHASE I RCRA FACILITY INVESTIGATION/REMEDIATION
INVESTIGATION (RFI/RI)

Submit Draft Phase I RFI/RI Work Plan May 16, 1991

Submit Final Phase I RFI/RI Work Plan October 11, 1991

Submit Draft Phase I RFI/RI Report July 16, 1993

Submit Final Phase I RFI/RI Report December 13, 1993

TABLE 6
FEDERAL FACILITY AGREEMENT AND CONSENT ORDER
MILESTONE SCHEDULE

SITE-WIDE ACTIVITIES

BACKGROUND STUDY

Submit Draft Background Study Report (Water)	December 15, 1989
Submit Draft Background Study Report (Soils)	December 15, 1989
Submit Revised Background Study Report	November 30, 1990

COMMUNITY RELATIONS

Submit Draft Community Survey Plan	January 23, 1990
Submit Final Community Survey Plan	March 22, 1990
Submit Draft Community Relations Plan	November 1, 1990
Submit Final Community Relations Plan	January 22, 1991
Submit Community Relations Plan Responsiveness Summary	June 21, 1991

HISTORICAL RELEASE REPORT

Submit Draft Historical Release Report	January 8, 1992
Submit Final Historical Release Report	June 3, 1992

HEALTH AND SAFETY PLAN

Submit Draft Health and Safety Plan	August 15, 1990
Submit Final Health and Safety Plan	November 12, 1990

PLAN FOR PREVENTION OF CONTAMINANT DISPERSION

Submit Draft Plan for Prevention of Contaminant Dispersion	September 19, 1990
Submit Final Plan for Prevention of Contaminant Dispersion	February 21, 1991
Submit Responsiveness Summary on Plan for Prevention of Contaminant Dispersion	June 26, 1991

DISCHARGE LIMITS FOR RADIONUCLIDES (Work Plan)

Submit Draft Work Plan for Discharge Limits for Radionuclides	March 18, 1991
Submit Final Work Plan for Discharge Limits for Radionuclides	August 13, 1991
Submit Responsiveness Summary Discharge Limits for Radionuclides	December 17, 1991

SAMPLING AND ANALYSIS PLAN

Submit Draft Quality Assurance Project Plan	August 29, 1990
Submit Final Quality Assurance Project Plan	November 29, 1990
Submit Draft Standard Operating Procedures	August 29, 1990
Submit Final Standard Operating Procedures	November 29, 1990

TREATABILITY STUDY

Submit Draft Treatability Study Plan	September 21, 1990
Submit Final Treatability Study Plan	February 25, 1991
Submit Draft Treatability Study Report	May 26, 1993
Submit Final Treatability Study Report	October 20, 1993

TABLE 6
FEDERAL FACILITY AGREEMENT AND CONSENT ORDER
MILESTONE SCHEDULE

OU 4
SOLAR PONDS

OU 4 SOLAR PONDS PHASE I RCRA FACILITY INVESTIGATION/
REMEDIAL INVESTIGATION (RFI/RI)

Submit Draft Phase I RFI/RI Work Plan	June 8, 1990
Submit Final Phase I RFI/RI Work Plan	November 26, 1991
Submit Draft Phase I RFI/RI Report	May 21, 1993
Submit Final Phase I RFI/RI Report	October 18, 1993

OU 4 SOLAR PONDS PHASE I INTERIM MEASURE/INTERIM
REMEDIAL ACTION

Submit Draft Phase I Proposed IM/IRA Decision Document	April 14, 1994
Submit Phase I Proposed IM/IRA Decision Document	September 12, 1994
Submit IM/IRA Responsiveness Summary	January 25, 1995
Submit Phase I Final IM/IRA Decision Document and Final Responsiveness Summary	April 24, 1995
Submit IM Design Work Plan	May 24, 1995
Submit Phase I IM/IRA Implementation Document	February 26, 1996
Submit Final IM Title II Design	June 24, 1996
Begin Phase I IM/IRA Construction	January 28, 1997

OU 4 SOLAR PONDS PHASE II RFI/RI

Submit Draft Phase II RFI/RI Work Plan	April 22, 1994
Submit Final Phase II RFI/RI Work Plan	September 19, 1994
Submit Draft Phase II RFI/RI Report	April 16, 1996
Submit Final Phase II RFI/RI Report	September 11, 1996

OU 4 SOLAR PONDS PHASE II CORRECTIVE MEASURES STUDY/
FEASIBILITY STUDY

Submit Draft Phase II CMS/FS Report

December 5, 1996

Submit Final Phase II CMS/FS Report

June 9, 1997

OU 4 SOLAR PONDS PHASE II CORRECTIVE AND REMEDIAL
ACTION PROPOSED PLAN (PP)

Submit Draft Phase II PP

June 9, 1997

Submit Final Phase II PP

September 5, 1997

Submit Phase II Responsiveness Summary

January 16, 1998

Submit Final Phase II Responsiveness Summary

April 14, 1998

OU 4 SOLAR PONDS PHASE II CORRECTIVE ACTION DECISION/
FINAL ACTION DECISION (CAD/FAD)

Submit Draft Phase II CAD/FAD

April 14, 1998

Submit Final Phase II CAD/FAD

July 14, 1998

OU 4 SOLAR PONDS PHASE II CORRECTIVE/REMEDIAL
DESIGN (CD/RD)

Submit CD/RD Work Plan

July 14, 1998

Submit Draft Title II Design

March 15, 1999

Submit Final Title II Design

June 14, 1999

OU 4 SOLAR PONDS PHASE II CORRECTIVE/REMEDIAL
ACTION (CA/RA)

Begin CA/RA Construction

January 18, 2000

TABLE 6
FEDERAL FACILITY AGREEMENT AND CONSENT ORDER
MILESTONE SCHEDULE

OU 5
WOMAN CREEK

OU 5 PHASE I RCRA FACILITY INVESTIGATION/REMEDIAL
INVESTIGATION (RFI/RI)

Submit Draft Phase I RFI/RI Work Plan	April 5, 1991
Submit Final Phase I RFI/RI Work Plan	August 30, 1991
Submit Draft Phase I RFI/RI Report	November 30, 1993
Submit Final Phase I RFI/RI Report	May 3, 1994

TABLE 6
FEDERAL FACILITY AGREEMENT AND CONSENT ORDER
MILESTONE SCHEDULE

OU 6
WALNUT CREEK

OU 6 PHASE I RCRA FACILITY INVESTIGATION/REMEDIAL
INVESTIGATION (RFI/RI)

Submit Draft Phase I RFI/RI Work Plan	April 19, 1991
Submit Final Phase I RFI/RI Work Plan	September 16, 1991
Submit Draft Phase I RFI/RI Report	August 4, 1993
Submit Final Phase I RFI/RI Report	January 7, 1994

TABLE 6
FEDERAL FACILITY AGREEMENT AND CONSENT ORDER
MILESTONE SCHEDULE

OU 7
PRESENT LANDFILL

OU 7 PRESENT LANDFILL PHASE I RFI/RI

Submit Draft Phase I RFI/RI Work Plan	June 8, 1990
Submit Final Phase I RFI/RI Work Plan	August 28, 1991
Submit Draft Phase I RFI/RI Report	October 12, 1993
Submit Final Phase I RFI/RI Report	March 16, 1994

OU 7 PRESENT LANDFILL PHASE I IM/IRA

Submit Draft Phase I Proposed IM/IRA Decision Document	November 1, 1994
Submit Final Phase I Proposed IM/IRA Decision Document	April 6, 1995
Submit IM/IRA Responsiveness Summary	August 14, 1995
Submit Final Phase I IM/IRA Decision Document and Responsiveness Summary	November 9, 1995
Submit IM/Design Work Plan	December 13, 1995
Submit Phase I IM/IRA Implementation Document	August 13, 1996
Submit IM Title II Design	December 12, 1996
Begin Phase I IM/IRA Construction	July 17, 1997

OU 7 PRESENT LANDFILL PHASE II RFI/RI

Submit Draft Phase II RFI/RI Work Plan	September 13, 1994
Submit Final Phase II RFI/RI Work Plan	February 15 1995
Submit Draft Phase II RFI/RI Report	September 9 1996
Submit Final Phase II RFI/RI Report	February 11 1997

OU 7 PRESENT LANDFILL PHASE II CMS/FS

Submit Draft Phase II CMS/FS Report

May 9, 1997

Submit Final Phase II CMS/FS Report

November 4, 1997

OU 7 PRESENT LANDFILL PHASE II CORRECTIVE AND
REMEDIAL ACTION PP

Submit Draft Phase II PP

November 4, 1997

Submit Final Phase II PP

February 10, 1998

Submit Phase II Responsiveness Summary

June 15, 1998

Submit Final Phase II Responsiveness Summary

September 10, 1998

OU 7 PRESENT LANDFILL PHASE II CAD/FAD

Submit Draft Phase II CAD/FAD

September 10, 1998

Submit Final Phase II CAD/FAD

December 10, 1998

OU 7 PRESENT LANDFILL PHASE II CD/RD

Submit CD/RD Work Plan

December 10, 1998

Submit Draft Title II Design

August 11, 1999

Submit Final Title II Design

November 9, 1999

OU 7 PRESENT LANDFILL PHASE II CA/RA

Begin CA/RA Construction

June 14, 2000

TABLE 6
FEDERAL FACILITY AGREEMENT AND CONSENT ORDER
MILESTONE SCHEDULE

OU 8
700 AREA

OU 8 700 AREA PHASE I RCRA FACILITY INVESTIGATION/
REMEDIAL INVESTIGATION (RFI/RI)

Submit Draft Phase I RFI/RI Work Plan	May 1, 1992
Submit Final Phase I RFI/RI Work Plan	September 28, 1992
Submit Draft Phase I RFI/RI Report	February 14, 1994
Submit Final Phase I RFI/RI Report	July 12, 1994

TABLE 6
FEDERAL FACILITY AGREEMENT AND CONSENT ORDER
MILESTONE SCHEDULE

OU 9
ORIGINAL PROCESS WASTE LINES

OU 9 ORIGINAL PROCESS WASTE LINES PHASE I RFI/RI

Submit Draft Phase I RFI/RI Work Plan	June 8, 1990
Submit Final Phase I RFI/RI Work Plan	November 26, 1991
Submit Draft Phase I RFI/RI Report	April 11, 1994
Submit Final Phase I RFI/RI Report	September 6, 1994

OU 9 ORIGINAL PROCESS WASTE LINES PHASE I IM/IRA

Submit Draft Phase I Proposed IM/IRA Decision Document	May 1, 1995
Submit Final Phase I Proposed IM/IRA Decision Document	September 27, 1995
Submit IM/IRA Responsiveness Summary	February 8, 1996
Submit Final Phase I IM/IRA Decision Document and Responsiveness Summary	May 7, 1996
Submit CD/RD Work Plan	June 7, 1996
Submit Phase I IM/IRA Implementation Document	February 7, 1997
Submit IM Title II Design	June 9, 1997
Begin Phase I IM/IRA Construction	January 13, 1998

OU ORIGINAL PROCESS WASTE LINES PHASE II RFI/RI

Submit Draft Phase II RFI/RI Work Plan	March 10, 1995
Submit Final Phase II RFI/RI Work Plan	August 7, 1995
Submit Draft Phase II RFI/RI Report	July 9, 1997
Submit Final Phase II RFI/RI Report	December 4, 1997

OU 9 ORIGINAL PROCESS WASTE LINES PHASE II CMS/FS

Submit Draft Phase II CMS/FS Report

March 10, 1998

Submit Final Phase II CMS/FS Report

September 3, 1998

OU 9 ORIGINAL PROCESS WASTE LINES PHASE II CORRECTIVE AND
REMEDIAL ACTION PP

Submit Draft Phase II PP

September 3, 1998

Submit Final Phase II PP

October 5, 1998

Submit Draft Phase II Responsiveness Summary

March 10, 1999

Submit Final Phase II Responsiveness Summary

June 7, 1999

OU 9 ORIGINAL PROCESS WASTE LINES PHASE II CAD/FAD

Submit Draft Phase II CAD/FAD

June 7, 1999

Submit Final Phase II CAD/FAD

September 3, 1999

OU 9 ORIGINAL PROCESS WASTE LINES PHASE II CD/RD

Submit CD/RD Work Plan

September 3, 1999

Submit Draft Title II Design Plans

May 5, 2000

Submit Final Title II Design Plans

August 4, 2000

OU 9 ORIGINAL PROCESS WASTE LINES PHASE II CA/RA

Begin CA/RA Construction

March 9, 2001

TABLF 6
FEDERAL FACILITY AGREEMENT AND CONSENT ORDER
MILESTONE SCHEDULE

OU 10
OTHER OUTSIDE CLOSURES

OU 10 OTHER OUTSIDE CLOSURES PHASE I RFI/RI

Submit Draft Phase I RFI/RI Work Plan	November 27, 1991
Submit Final Phase I RFI/RI Work Plan	May 1, 1992
Submit Draft Phase I RFI/RI Report	August 25, 1994
Submit Final Phase I RFI/RI Report	January 30, 1995

OU 10 OTHER OUTSIDE CLOSURES PHASE I IM/IRA

Submit Draft Phase I Proposed IM/IRA Decision Document	May 26, 1995
Submit Final Phase I Proposed IM/IRA Decision Document	October 24, 1995
Submit IM/IRA Responsiveness Summary	March 6, 1996
Submit Final Phase I IM/IRA Decision Document and Responsiveness Summary	June 4, 1996
Submit CD/RD Work Plan	July 5, 1996
Submit Phase I IM/IRA Implementation Document	March 6, 1997
Submit IM Title II Design	July 7, 1997
Begin Phase I IM/IRA Construction	February 9, 1998

OU 10 OTHER OUTSIDE CLOSURES PHASE II RFI/RI

Submit Draft Phase II RFI/RI Work Plan	June 27, 1995
Submit Final Phase II RFI/RI Work Plan	November 21, 1995
Submit Draft Phase II RFI/RI Report	October 23, 1997
Submit Final Phase II RFI/RI Report	March 30, 1998

OU 10 OTHER OUTSIDE CLOSURES PHASE II CMS/FS

Submit Draft Phase II CMS/FS Report

June 25, 1998

Submit Final Phase II CMS/FS Report

December 22, 1998

OU 10 OTHER OUTSIDE CLOSURES PHASE II CORRECTIVE AND
REMEDIAL ACTION PP

Submit Draft Phase II PP

December 22, 1998

Submit Final Phase II PP

March 30, 1999

Submit Draft Phase II Responsiveness Summary

August 3, 1999

Submit Final Phase II Responsiveness Summary

October 28, 1999

OU 10 OTHER OUTSIDE CLOSURES PHASE II CAD/FAD

Submit Draft Phase II CAD/FAD

October 28, 1999

Submit Final Phase II CAD/FAD

February 4, 2000

OU 10 OTHER OUTSIDE CLOSURES PHASE II CD/RD

Submit CD/RD Work Plan

February 4, 2000

Submit Draft Title II Design Plans

September 28, 2000

Submit Final Title II Design Plans

January 5, 2001

OU 10 OTHER OUTSIDE CLOSURES PHASE II CA/RA

Begin CA/RA Construction

August 2, 2001

TABLE 6
FEDERAL FACILITY AGREEMENT AND CONSENT ORDER
MILESTONE SCHEDULE

OU 11
WEST SPRAY FIELD

OU 11 WEST SPRAY FIELD PHASE I RFI/RI

Submit Draft Phase I RFI/RI Work Plan	June 8, 1990
Submit Final Phase I RFI/RI Work Plan	January 2, 1992
Submit Draft Phase I RFI/RI Report	September 20, 1994
Submit Final Phase I RFI/RI Report	February 22, 1995

OU 11 WEST SPRAY FIELD PHASE I IM/IRA

Submit Draft Phase I Proposed IM/IRA Decision Document	October 10, 1995
Submit Final Phase I Proposed IM/IRA Decision Document	March 14, 1996
Submit Phase I IM/IRA Responsiveness Summary	July 22, 1996
Submit Phase I Final IM/IRA Decision Document and Final Responsiveness Summary	October 17, 1996
Submit IM Design CD/RD Work Plan	November 18, 1996
Submit Phase I IM/IRA Implementation Document	July 22, 1997
Submit IM Title II Design	November 18, 1997
Begin Phase I IM/IRA Construction	June 24, 1998

OU 11 WEST SPRAY FIELD PHASE II RFI/RI

Submit Draft Phase II RFI/RI Work Plan	August 21, 1995
Submit Final Phase II RFI/RI Work Plan	January 24, 1996
Submit Draft Phase II RFI/RI Report	August 13, 1997
Submit Final Phase II RFI/RI Report	January 16, 1998

OU WEST SPRAY FIELD PHASE II CMS/FS

Submit Draft Phase II CMS/FS Report April 15, 1998

Submit Final Phase II CMS/FS Report October 9, 1998

OU 11 WEST SPRAY FIELD PHASE II CORRECTIVE AND
FINAL ACTION PP

Submit Draft Phase II PP October 9, 1998

Submit Final Phase II PP January 21, 1999

Submit Phase II Responsiveness Summary May 25, 1999

Submit Final Phase II Responsiveness Summary August 20, 1999

OU 11 WEST SPRAY FIELD PHASE II CAD/FAD

Submit Draft Phase II CAD/FAD August 20, 1999

Submit Final Phase II CAD/FAD November 18, 1999

OU 11 WEST SPRAY FIELD PHASE II CD/RD DESIGN

Submit CD/RD Work Plan November 18, 1999

Submit Draft Title II Design Plans July 21, 2000

Submit Final Title II Design Plans October 19, 2000

OU 11 WEST SPRAY FIELD PHASE II CA/FA

Begin Phase II CA/RA Construction May 24, 2001

TABLE 6
FEDERAL FACILITY AGREEMENT AND CONSENT ORDER
MILESTONE SCHEDULE

OU 12
400/800 AREA

OU 12 400/800 AREA PHASE I RCRA FACILITY INVESTIGATION/
REMEDIAL INVESTIGATION (RFI/RI)

Submit Draft Phase I RFI/RI Work Plan	May 8, 1992
Submit Final Phase I RFI/RI Work Plan	October 5, 1992
Submit Draft Phase I RFI/RI Report	April 20, 1994
Submit Final Phase I RFI/RI Report	September 15, 1994

TABLE 6
FEDERAL FACILITY AGREEMENT AND CONSENT ORDER
MILESTONE SCHEDULE

OU 13
100 AREA

OU 13 100 AREA PHASE I RCRA FACILITY INVESTIGATION/
REMEDIAL INVESTIGATION (RFI/RI)

Submit Draft Phase I RFI/RI Work Plan	May 15, 1992
Submit Final Phase I RFI/RI Work Plan	October 12, 1992
Submit Draft Phase I RFI/RI Report	August 8, 1994
Submit Final Phase I RFI/RI Report	January 11, 1995

TABLE 6
FEDERAL FACILITY AGREEMENT AND CONSENT ORDER
MILESTONE SCHEDULE

OU 14
RADIOACTIVE SITES

OU 14 RADIOACTIVE SITES PHASE I RCRA FACILITY INVESTIGATION/
REMEDIAL INVESTIGATION (RFI/RI)

Submit Draft Phase I RFI/RI Work Plan	May 22, 1992
Submit Final Phase I RFI/RI Work Plan	October 19, 1992
Submit Draft Phase I RFI/RI Report	December 20, 1994
Submit Final Phase I RFI/RI Report	May 23, 1995

TABLE 6
FEDERAL FACILITY AGREEMENT AND CONSENT ORDER
MILESTONE SCHEDULE

OU 15
INSIDE BUILDING CLOSURES

OU 15 PHASE I RCRA FACILITY INVESTIGATION/
REMEDIAL INVESTIGATION (RFI/RI)

Submit Draft Phase I RFI/RI Work Plan	June 1, 1992
Submit Final Phase I RFI/RI Work Plan	October 26, 1992
Submit Draft Phase I RFI/RI Report	August 1, 1994
Submit Final Phase I RFI/RI Report	January 4, 1995

TABLE 6
FEDERAL FACILITY AGREEMENT AND CONSENT ORDER
MILESTONE SCHEDULE

OU 16
LOW-PRIORITY SITES

OU 16 NO FURTHER ACTION JUSTIFICATION

Submit Draft No Further Action Justification
Document

March 4, 1992

Submit Final No Further Action Justification
Document

July 30, 1992

APPENDIX IV
DEPARTMENTS CITED IN THIS PLAN

HEALTH AND SAFETY DEPARTMENT

- | | | |
|---|------------------|----------------|
| 1) Radiological Operations | Dale Hardin | Extension 2826 |
| a. Radiological Operations
707/779/991 | Eugene Dicarlo | Extension 5390 |
| b Radiological Operations
371/374 | Larry Rands | Extension 7060 |
| c Radiological Operations
771/774 | Eugene McCracken | Extension 4711 |
| d Radiological Operations
559/776/777 | Steve Fields | Extension 2841 |
| e Radiological Engineering
Non PSZ | John Ray | Extension 2238 |
| 2) Radiological Environmental Engineering | Sara Buckle | Extension 4439 |
| a. Radiological Building Engineer | Susan Anderson | Extension 4846 |
| 1 Radiological Environmental Engineer | Richard Renee | Extension 5150 |
| b Radiological Project Engineer | Dick Link | Extension 5771 |
| c Radiological Support Engineer | Lloyd Burton | Extension 4690 |
| 3) Radiological Measurements | Mark Peters | Extension 2322 |
| a. Dosimetry | Joe Aldrich | Extension 2452 |
| b Radiological Instrumentation | Eugene Crusan | Extension 7279 |
| c Radiological Measurements Lab | Conrad Trice | Extension 2429 |
| 4) Industrial Hygiene | Todd Lewis | Extension 4081 |
| a. IH Operations | Bret Clauson | Extension 7781 |
| b IH Programs | Bob Cordova | Extension 5827 |

5) Health and Safety Area Eng	Jack Weaver	Extension 7571
6) Health and Safety Support Systems	Carol Baker	Extension 7968
7) Occupational Safety	Coburn Kennedy	Extension 4369
a. Industrial Safety	Don Burkhart	Extension 7538
b Construction & Environmental Safety	Larry Ross	Extension 7538
8) Occupational Health	Joe Furman M. D.	Extension 2895
a. Health Services	Patricia Carden	Extension 4696

ENVIRONMENTAL RESTORATION

1) Environmental Restoration	Tom Greengard	Extension 7121
a Remedial Investigations	Tom Greengard	Extension 7121
b Remedial Actions	Jim Koffer	Extension 5949
c Permitting and Compliance	TBD	Extension
d Program Planning & Control	Eileen Jemison	Extension 2302
e Remedial Engineering	Gary Anderson	Extension 5747
f Quality Assurance	Larry McInroy	Extension 279-7242
2) Environmental Monitoring & Assessment	Mike Arndt	Extension 4294
a Soils, Surface Water, Sediments	Peter Fogler	Extension 5972
b Hydrogeology, Geophysics	Jim Langman	Extension 5975
c Air Programs	Wand Busby	Extension 5603
d Data Management	Greg Underberg	Extension 5970
e QA Support Systems	Karen Schoendaller	Extension 5958

3) Clean Air & Environment Reporting	George Setlock	Extension 2453
a. Clean Air Act	David R. Maxwell	Extension 2453
b. Environmental Reporting	TBD	
4) Clean Water Act	Farrel Hobbs	Extension 7006
a. Permitting & Compliance	Mark Levin	Extension 4237
b. Surface Water Upgrades	Keith Motyl	Extension 4074
c. Operations & surveillance	Ralph Hawes	Extension 2582
5) NEPA	Laura Frick	Extension 4643
a. Plant Compliance	Kathy London	Extension 2443
b. Remediation & Risk Assessment	Steve Nesta	Extension 5980
c. Mitigation & Implementation	Dan Shain	Extension 5911
d. Plant & Environment Impact Statements	Gene Krupp	Extension 5910
6) EG&G Training	Evain Ruby	Extension 966-6318

APPENDIX III
TOXICOLOGICAL REFERENCES

TOXICOLOGICAL REFERENCES

1. Handbook of Toxic and Hazardous Chemicals and Carcinogens, Second Edition; Noyes Publications, Park Ridge, NJ; 1985.
2. Dangerous Properties of Industrial Materials, Seventh Edition; Van Nostrand Reinhold, NY, 1989.
3. NIOSH Pocket Guide to Chemical Hazards, U.S. Department of Health and Human Services, 1985.
4. Chemical Hazard Response Information System (CHRIS), U.S. Department of Transportation, 1984.
5. Threshold Limit Values and Biological Exposure Indices for 1989-1990, American Conference of Governmental Industrial Hygienists, Cincinnati, OH, 1989.
6. OSHA 3112. Air Contaminants - Permissible Exposure Limits, 29 Code of Federal Regulations 1910.1000.
7. Odor Thresholds for Chemical With Established Occupational Health Standards. American Industrial Hygiene Association, Akron, OH, 1989.

GLOSSARY of TERMS

From 29 CFR 1910.120:

"Hazardous Waste Operations and Emergency Response"

Buddy System -

a system of organizing employees into work groups in such a manner that each employee of the group is designated to be observed by at least one other employee in the work group. The purpose of the buddy system is to provide rapid assistance to employees in the event of an emergency

Clean-up Operation -

an operation where hazardous substances are removed, contained, incinerated, neutralized, stabilized, cleared-up, or in any other manner processed or handled with the ultimate goal of making the site safer for people or the environment.

CEDE -

Committed Effective Dose Equivalent is a model developed to determine the potential radiation dose an employee may be exposed to during one year of operations. The term is usually used in conjunction with DACs to determine radiation exposures in the workplace.

Confined Space Entry -

entry into an area having limited access and (usually) no alternate escape route, having severely limited natural ventilation or an atmosphere containing less than 20% oxygen, and having the ability of accumulating a toxic, flammable, or explosive atmosphere, or being flooded

Decontamination -

the removal of hazardous substances from employees and their equipment to the extent necessary to preclude the occurrence of foreseeable adverse health effects.

Emergency Response -

a response effort by employees from outside the immediate release area or by other designated responders (i.e., mutual-aid groups, local fire departments) to an occurrence which results or is likely to result in an uncontrolled release of a hazardous substance. Response to incidental releases of hazardous substances where the substance can be absorbed, neutralized, or otherwise controlled at the time of the release by employees in the immediate area, or by maintenance personnel are not considered to be emergency responses. Response to a release of hazardous substances where there is no potential safety or health hazards is not considered to be an emergency response.

Facility -

any building, structure, installation, equipment, pipe or pipeline, well, pit, pond, lagoon, impoundment, ditch, storage container, motor vehicle, or aircraft. Any site where a hazardous substance has been deposited, stored, disposed of, or placed, or otherwise come to be located, but does not include any consumer product in use by the consumer or any water-borne vessel

Hazardous Substance -

any substance designated or listed under paragraphs (A) through (D) of the OSHA definition where exposure to which results or may result in adverse affects on the health or safety of employees. The OSHA definitions are as follows:

A) Any substance defined under section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

B) Any biological agent and othe disease-causing agent which after release into the environment and upon exposure, injestion, inhalation, or assimilation into any person, either directly from the environment or indirectly by injestion through food chains, will or may reasonable be anticipated to cause death, disease, behavioral abnormalities, cancer, genetic mutation, physiological malfunctions, or physical deformations in such persons or their offspring

C) Any substance listed by the U.S. Department of Transportation as hazardous material under the Code of Federal Regulations number 49, Part 172.101.

D) Hazardous wastes as herein defined.

Hazardous Waste -

a material that exhibits the characteristics of a hazardous waste or is a listed waste as defined in the Code of Federal Regulations number 40, Part 261.3 or the Code of Federal Regulations number 49, Part 171.8.

Hazardous Waste Operations -

any operation conducted within the scope of this standard.

Hazardous Waste Site or "Site" -

any facility or location within the scope of this standard at which hazardous waste operations take place.

Health Hazard -

a chemical, a mixture or chemicals, or a pathogen for which there is sstatistically significant evidence that acute or chronic health effects may occur in exposed employees. The term includes chemicals which are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, and agents which damage the lungs, skin, eyes, or mucous membranes. A health hazard also includes body stress due to temperature extremes. The specific definition of the above terms can be found in the Code of Federal Regulations number 29, Part 1910.1200

IDLH or Immediately Dangerous to Life or Health -

an atmospheric concentration or any toxic, corrosive, or asphyxiant substance that poses an immediate threat to life or would cause irreversible or delayed adwers health effects or would interfere with an individual's ability to escape from a dangerous atmosphere.

Medical Surveillance -

a program to monitor an employee's exposure to hazardous or toxic substances. The program includes pre-employment screening, periodic medical examinations, and termination examinations.

Oxygen Deficiency -

atmospheres where the percentage of oxygen by volume is less than 19.5 percent oxygen. Atmosphere-supplying respiratory protection must be provided.

Permissible Exposure Limit -

the exposure, inhalation or dermal permissible exposure limit specified in the Code of Federal Regulations number 29, Part 1910, Subparts G and Z.

Published exposure level -

means the exposure limits published in "NIOSH Recommendations for Occupational Health Standards" dated 1986 incorporated by reference, or if none is specified, the exposure limits published in the standards specified by the American Conference of Governmental Industrial Hygienists in their publication "Threshold Limit Values and Biological Exposure Indices for 1987-88" dated 1987 incorporated by reference.

Post emergency -

means that portion of an emergency response performed after the immediate threat of a release has been stabilized or eliminated and clean-up of the site has begun. If post emergency response is performed by an employer's own employees who were part of the emergency initial response, it is considered to be part of emergency response and not post emergency response. However, if a group of employer's own employees, separate from the group providing initial response, performs the clean-up operations, then the separate group of employees would be considered to be performing post-emergency response and subject to paragraph (q)(11) of this section.

Qualified person -

means a person with specific training, knowledge and experience in the area for which the person has the responsibility and the authority to control.

Site safety and safety supervisor -

means the individual located on a hazardous waste site who is responsible to the employer and has the authority and knowledge necessary to implement the site safety and health plan and verify compliance with applicable safety and health requirements.

Small quantity generator -

means a generator of hazardous wastes who in any calendar month generates no more than 1,000 kilograms (2,205 pounds) of hazardous waste in that month.

Uncontrolled hazardous waste site -

means an area where an accumulation of hazardous waste creates a threat to the health and safety of individuals or the environment or both. Some sites are found on public lands, such as those created by former municipal, county or state landfills where illegal or poorly managed waste disposal has taken place. Other sites are found on private property, often belonging to generators of former generators of hazardous waste. Examples of such sites include, but are not limited to, surface impoundments, landfills, dumps, and tank or drum farms. Normal operations at TSD sites are not covered by this definition.

Personal protective equipment is divided into four categories based on the degree of protection afforded.

Level A -

a term describing a protection level afforded by using the following personal protective equipment:

- 1) Positive pressure, full facepiece self contained breathing apparatus (SCBA) or positive pressure supplied air respirator with SCBA, approved by the National Institute for Occupational Safety and Health.**
- 2) Totally -encapsulating chemical protective suit**
- 3) Coveralls**
- 4) Long underwear**
- 5) Inner and outer chemically resistant gloves**
- 6) Chemical resistant boots/shoes**
- 7) Hard hat**
- 8) Disposable protective suit, gloves, and boots**

Level B -

a term describing a protection level afforded by using the following personal protective equipment

- 1) Positive pressure, full facepiece self contained breathing apparatus (SCBA) or positive pressure supplied air respirator with SCBA, approved by the National Institute for Occupational Safety and Health.**
- 2) Chemical resistant clothing**
- 3) Inner and outer chemically resistant gloves**
- 4) Chemical resistant boots/shoes**
- 5) Hard Hat**
- 6) Two-way radio**

Level C -

a term describing a protection level afforded by using the following personal protective equipment.

- 1) Positive pressure, full facepiece self contained breathing apparatus (SCBA) or positive pressure supplied air respirator with SCBA, approved by the National Institute for Occupational Safety and Health Canister equipped respirator**
- 2) Chemical resistant clothing**
- 3) Inner and outer chemically resistant gloves**
- 4) Chemical resistant boots/shoes**
- 5) Hard hat**
- 6) Two-way radio**

Level D -

a term describing a protection level afforded by using the following personal protective equipment:

- 1) Coveralls
- 2) Chemical resistant boots/shoes
- 3) Safety glasses/chemical splash goggles
- 4) Hard Hat

APPENDIX IV
DEPARTMENTS CITED IN THIS PLAN

HEALTH AND SAFETY DEPARTMENT

1) Radiological Operations	Dale Hardin	Extension 2826
a. Radiological Operations 707/779/991	Eugene Dicarlo	Extension 5390
b Radiological Operations 371/374	Larry Rands	Extension 7060
c Radiological Operations 771/774	Eugene McCracken	Extension 4711
d Radiological Operations 559/776/777	Steve Fields	Extension 2841
e Radiological Engineering Non PSZ	John Ray	Extension 2238
2) Radiological Environmental Engineering	Sara Buckie	Extension 4439
a. Radiological Building Engineer	Susan Anderson	Extension 4846
1 Radiological Environmental Engineer	Richard Renee	Extension 5150
b Radiological Project Engineer	Dick Link	Extension 5771
c Radiological Support Engineer	Lloyd Burton	Extension 4690
3) Radiological Measurements	Mark Peters	Extension 2322
a. Dosimetry	Joe Aldrich	Extension 2452
b Radiological Instrumentation	Eugene Crusan	Extension 7279
c. Radiological Measurements Lab	Conrad Trice	Extension 2429
4) Industrial Hygiene	Todd Lewis	Extension 4081
a IH Operations	Bret Clauson	Extension 7781
b IH Programs	Bob Cordova	Extension 5827

5) Health and Safety Area Eng	Jack Weaver	Extension 7571
6) Health and Safety Support Systems	Carol Baker	Extension 7968
7) Occupational Safety	Coburn Kennedy	Extension 4369
a. Industrial Safety	Don Burkhart	Extension 7538
b Construction & Environmental Safety	Larry Ross	Extension 7538
8) Occupational Health	Joe Furman M. D	Extension 2895
a Health Services	Patricia Carden	Extension 4696

ENVIRONMENTAL RESTORATION

1) Environmental Restoration	Tom Greengard	Extension 7121
a Remedial Investigations	Tom Greengard	Extension 7121
b Remedial Actions	Jim Koffer	Extension 5949
c Permitting and Compliance	TBD	Extension
d Program Planning & Control	Eileen Jemison	Extension 2302
e Remedial Engineering	Gary Anderson	Extension 5747
f Quality Assurance	Larry McInroy	Extension 279-7242
2) Environmental Monitoring & Assessment	Mike Arndt	Extension 4294
a Soils, Surface Water, Sediments	Peter Fogler	Extension 5972
b Hydrogeology, Geophysics	Jim Langman	Extension 5975
c Air Programs	Wand Busby	Extension 5603
d Data Management	Greg Underberg	Extension 5970
e QA Support Systems	Karen Schoendaller	Extension 5958

3) Clean Air & Environment Reporting	George Setlock	Extension 2453
a. Clean Air Act	David R. Maxwell	Extension 2453
b. Environmental Reporting	TBD	
4) Clean Water Act	Farrel Hobbs	Extension 7006
a. Permitting & Compliance	Mark Levin	Extension 4237
b. Surface Water Upgrades	Keith Motyl	Extension 4074
c. Operations & surveillance	Ralph Hawes	Extension 2582
5) NEPA	Laura Frick	Extension 4643
a. Plant Compliance	Kathy London	Extension 2443
b. Remediation & Risk Assessment	Steve Nesta	Extension 5980
c. Mitigation & Implementation	Dan Shain	Extension 5911
d. Plant & Environment Impact Statements	Gene Krupp	Extension 5910
6) EG&G Training	Evain Ruby	Extension 966-6318

ACGIH - American Conference of Governmental Industrial Hygienists

AEDE - Annual Effective Dose Equivalent

ASC - Administrative Safety Controls

CAER - Clean Air Environmental Reporting

CBT - Computer Based Training

CDH - Colorado Department of Health

CEDE - Committed Effective Dose Equivalent

CERCLA - Comprehensive Environmental Response, Compensation and Liability Act

CM - Construction Management

CPR - Cardiopulmonary Resuscitation

CWAD - Clean Water Action Division

DAC - Derived Air Concentration

DBA - Decibels, A scale

DOE - Department of Energy

EC - Emergency Coordinator

EMAD - Environmental Monitoring and Assessment Division

EMT - Emergency Medical Technician

EPA - Environmental Protection Agency

ER - Environmental Restoration

ERD - Environmental Restoration Division

ERHSO - Environmental Restoration Health and Safety Officer

FE - Facilities Engineering

FEV/FEC - Forced Expiratory Volume/Forced Vital Capacity

FID - Flame Ionization Detector

FPM -	Facilities Project Manager
GC -	Gas Chromatograph
H&S -	Health and Safety
HSP -	Health and Safety Program
HSPP -	Health and Safety Program Plan
IAG -	Inter-agency Agreement
IDLH -	Immediately Dangerous to Life or Health
IH -	Industrial Hygiene
JSA -	Job Safety Analysis
LEL -	Lower Explosive Limit
LRA -	Lead Regulatory Agency
MSDS -	Material Safety Data Sheet
NEPA -	National Environmental Protection Act Division
NIOSH -	National Institute for Occupational Safety and Health
NPL -	National Priority List
OSA -	Operational Safety Analysis
OSHA -	Occupational Safety and Health Administration
OJT -	On-the-job Training
O ₂ -	Oxygen
OU -	Operable units
PCB -	Polychlorinated Biphenyl
PE -	Project Engineer
PEL -	Permissible Exposure Limit
PID -	Photoionization Detector

PPE - Personal Protective Equipment

RCRA - Resource Conservation and Recovery Act

RFP - Rocky Flats Plant

RI/FS - Remedial Investigation/Feasibility Study

RN - Registered Nurse

SHSC - Site Health and Safety Coordinator

SMAC 23 - A series of tests performed during the medical examinations for the purpose of evaluating liver function

SOP - Standard Operation Procedure

SSO - Site Safety Officer

TRU - Transuranium or Transuranic

TSD - Treatment Storage and Disposal Facility

TWA - Time Weighted Average

WBGT - Wet Bulb Globe Temperature

WO - Waste Operations Procedures



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" THIS PLAN B ... 'RUNNING AND SCREAMING IN ALL DIRECTIONS' ... HOW'S IT WORKING OUT ? "